THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXIX. No. 2178.] LONDON, FEBRUARY 7, 1905. [57TH YEAR. PRICE 6d.

PARKER & LESTER,

— ESTABLISHED 1830. —

MANUFACTURERS AND CONTRACTORS. **ORMSIDE STREET, LONDON, S.E.**

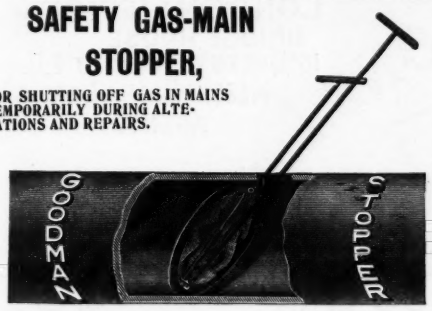
THE ONLY MAKERS OF

PATENT ANTIMONY PAINT & PARKER'S IMPERIAL BLACK VARNISH.

OXIDE PAINTS, OILS, AND GENERAL STORES, FOR GAS AND WATER WORKS.

SAFETY GAS-MAIN STOPPER,

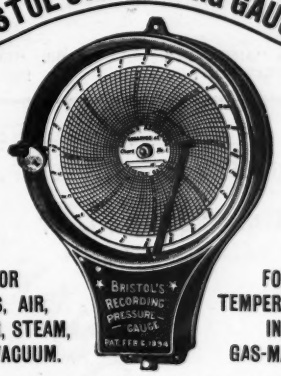
FOR SHUTTING OFF GAS IN MAINS TEMPORARILY DURING ALTERATIONS AND REPAIRS.



GAS-LEAK INDICATOR.

PRICES AND PARTICULARS ON APPLICATION.

BRISTOL'S RECORDING GAUGES



FOR GAS, AIR, WATER, STEAM, OR VACUUM.

FOR TEMPERATURE IN GAS-MAINS.

Many Thousands in Daily Operation.

J. W. & C. J. PHILLIPS,
23, COLLEGE HILL,
LONDON, E.C.

All Pipes marked

"S.A.V."

Telegrams: "AMOUR, LONDON."
Telephone Nos.: 1890 HOLBORN; CENTRAL 194.

VERTICALLY CAST IRON PIPES.

The only Foundry in Europe casting Pipes under Clarifying Process.

A. G. CLOAKE,
54, HOLBORN VIADUCT, LONDON, E.C.

BIGGS, WALL, & CO.,

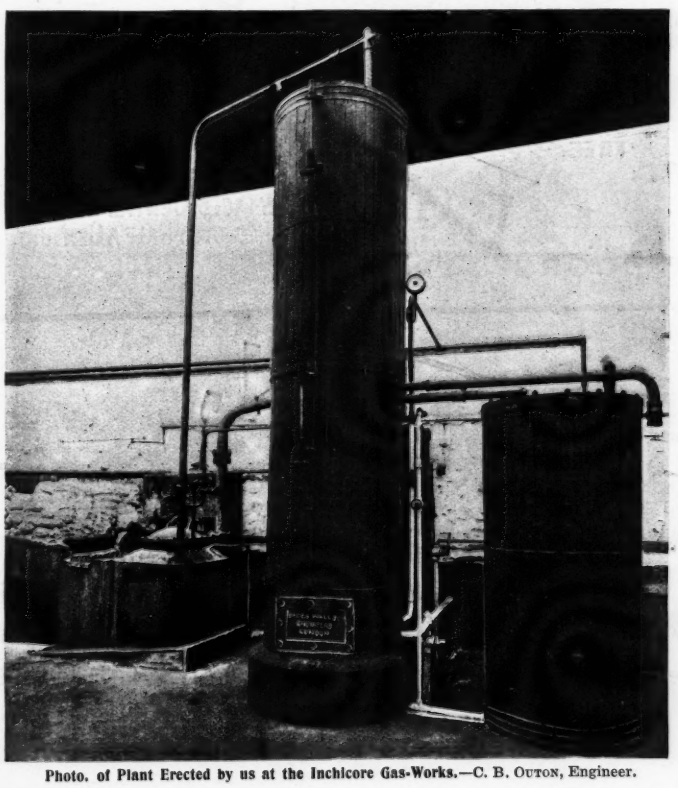


Photo. of Plant Erected by us at the Inchicore Gas-Works.—C. B. OUTON, Engineer.

Gas Engineers and Chemical Plumbers,

13, CROSS ST., FINSBURY, LONDON.

Telegraphic Address: "RAGOUT LONDON."

Telephone No. 273 CENTRAL.

SPECIALITY:

Sulphate of Ammonia Plants with our **Improved Still**, trays removable and easily cleaned, highest economy in working, splendid quality of salt (actual results in practice, 25·50 per cent. of ammonia), self-discharging Saturators and every modern improvement. **Lead Burners** sent anywhere on receipt of telegram, for urgent repairs.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "Evans, Wolverhampton." London Address: Salisbury House, London Wall, London, E.C. National Telephone: No. 7039.

Please apply for Catalogue No. 8.

12,000 PUMPS IN STOCK AND PROGRESS.

TRADE MARK.

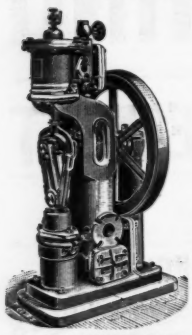


Fig. 705. "SINGLE RAM" STEAM-PUMP.

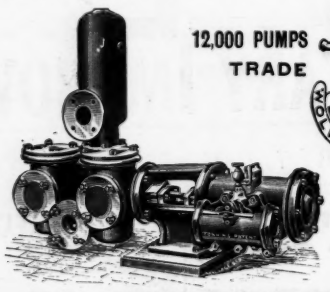


Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

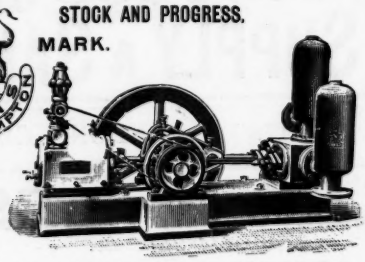


Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

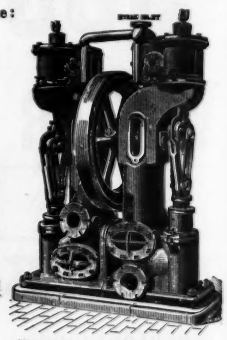


Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

PATENT ADJUSTABLE OVERFLOWS.

ENGINEERS & CONTRACTORS FOR GAS WORKS PLANT OF EVERY DESCRIPTION.

EDWARD COCKEY AND SONS, LIMITED.

LONDON OFFICE: BRIDGE HOUSE 181, QUEEN VICTORIA ST. E.C. MESSRS. BALE & HARDY, AGENTS.

PATENT WASHERS

PATENT COMBINED BYE-PASS & COMPENSATOR FOR EXHAUSTERS.

ESTIMATES AND MAKERS OF PATENTEES IMPROVED VALVES

SCREW VALVES. SEAL REGULATING VALVES. GASHOLDER VALVES. COMPENSATING VALVES. SELF ACTING BYE PASS VALVES. CENTRE VALVES. DISC VALVES. FOURWAY VALVES. SLIDE VALVES.

CENTRE VALVES FOR WORKING 1, 2, 3, OR 4 PURIFIERS TOGETHER

1400 CENTRE VALVES HAVE BEEN SUPPLIED

ENQUIRIES INVITED.

DRY FACED CENTRE FREE.

THE IRONWORKS FROME, SOMERSET.

TELEGRAPHIC ADDRESS "COCKEYS FROME" "DAMPER LONDON"

ORIGINAL MAKERS OF DRY-FACED CENTRE VALVES. ESTABLISHED OVER HALF A CENTURY.

PATENT FIRE DOORS & FRAMES.

Every Description of

FIRE-CLAY GOODS

OF BEST QUALITY ONLY.

Personal attention given to all orders.

MOBBERLEY & PERRY, STOURBRIDGE.

INCLINED AND HORIZONTAL RETORTS of both Taper and Parallel Sections.

SPECIALS FOR WATER GAS PLANTS

CHECKER BRICKS ALWAYS IN STOCK

LARGE STOCKS KEPT.

THE BARROWFIELD IRON-WORKS, LTD.,

GAS ENGINEERS AND CONTRACTORS,

Telegrams:
"GASOMETER, GLASGOW."

GLASGOW.

OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.

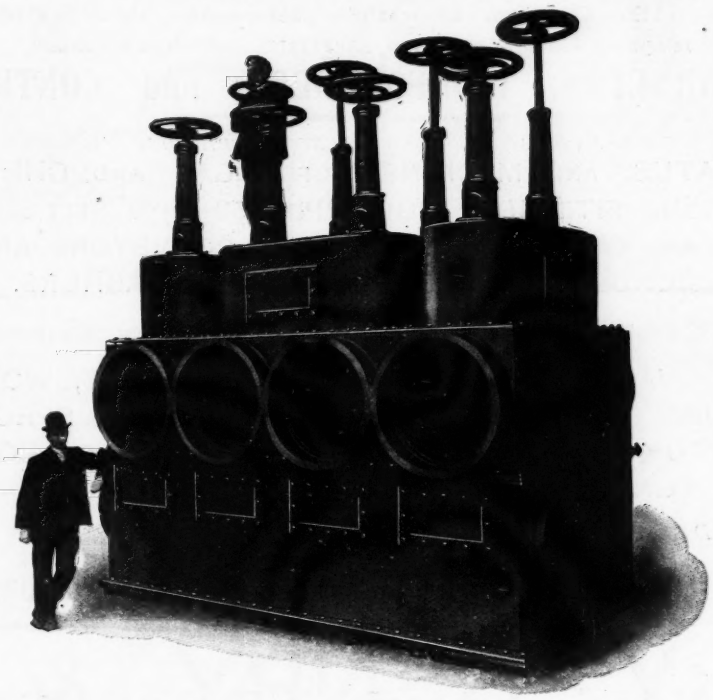
GAS APPARATUS OF EVERY DESCRIPTION.

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM-BOILERS, AND FITTINGS.

London Office:
6, LITTLE BUSH LANE, CANNON STREET, E.C.



Weck's Centre-Valve for 30-inch Connections for GRANTON GAS-WORKS of the EDINBURGH and LEITH CORPORATIONS GAS COMMISSIONERS.

GEORGE ORME & CO. (Branch of Meters Ltd.)

ATLAS METER WORKS,

Tel. Address: "ORME OLDHAM."
Telephone No. 93 Oldham.

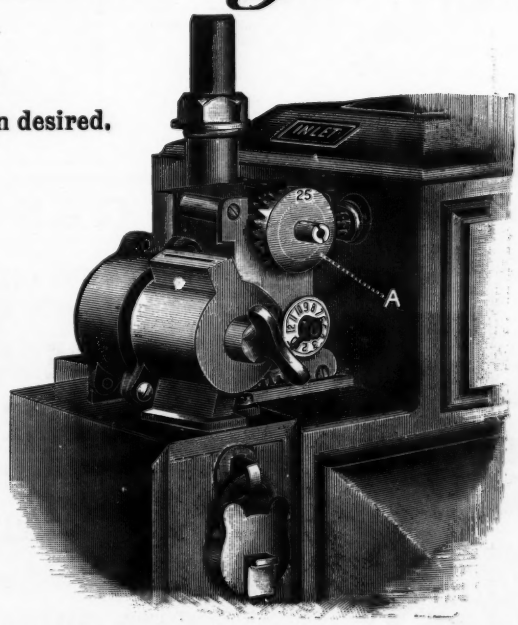
PARK STREET, OLDHAM.

"NEW CENTURY" PATTERN

Patent Coin *Prepayment Gas-Meters*

Fitted with Detachable Attachments.

Arranged for 1d., 1s., or any other Coin desired.



Change of Price effected by simply removing Crown Wheel "A" and replacing same with another Wheel.

ANY FURTHER PARTICULARS WILL BE SUPPLIED UPON APPLICATION.

NEWTON, CHAMBERS, & CO.,

LIMITED.

THORNCLIFFE IRON-WORKS, near SHEFFIELD.

Established 1790

LONDON OFFICE: **19, Great George Street, WESTMINSTER.**

Telegraphic Addresses, "NEWTON, SHEFFIELD," "ACCOLADE, LONDON."

GAS ENGINEERS, IRONFOUNDERS, and CONTRACTORS.

MANUFACTURERS OF EVERY DESCRIPTION OF

PLANT, APPARATUS, AND MACHINERY FOR GAS AND CHEMICAL WORKS.
RETORTS AND FITTINGS, MOUTHPIECES WITH SELF-SEALING LIDS.
IMPROVED COAL AND COKE HANDLING PLANT, CONVEYORS, AND ELEVATORS.
CONDENSERS, SCRUBBERS, AND WASHERS.

PURIFIERS with Planed Joints a Specialty.

PATENT CENTRE-VALVES, RACK AND SCREW VALVES, WOOD GRIDS AND SCRUBBER-BOARDS, CAST-IRON MAINS, AND SPECIALS.
STRUCTURAL WORK, COLUMNS, GIRDERS, AND ROOFING.
GASHOLDERS, CAST-IRON OR STEEL TANKS.

DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

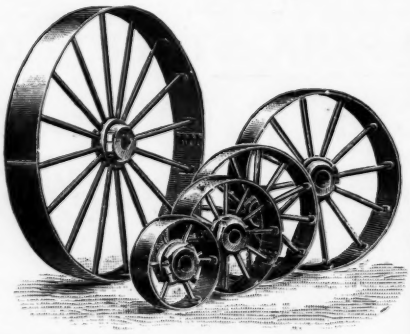
PIG IRON (SPECIAL QUALITY) for Engine Cylinders. GAS COAL famous for its Unrivalled excellence.

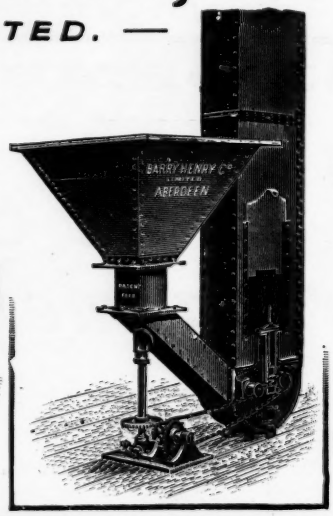
BARRY, HENRY, & CO.,

— *LIMITED.* —

Specialities:
TRANSMISSION OF POWER.
Rope & Belt Pulleys,
Spur & Bevel Wheels,
Shafting & Couplings,
Pedestals, & Fixings.

WORKS:
ABERDEEN,
SCOTLAND.





Specialities:
TRANSMISSION OF MATERIALS.
Conveyors,
Elevators,
Grinding Machinery,
Motors.

AND
64, MARK LANE
LONDON, E.C.

GAS
THE WINSTANLEY SPECIALTY COY.
ENGINEERS

GAS ENGINEERS.

CONTRACTORS FOR, AND ERECTORS OF, ALL GAS-WORKS PLANT.

REGENERATORS, GENERATORS, AND DIRECT-FIRED RETORTS.

RESULTS GUARANTEED.

COMPLETE INSTALLATIONS OF HORIZONTAL AND INCLINED RETORTS.

ADDRESS—
NEWTON CHAMBERS, CANNON ST., **BIRMINGHAM.**

WELSBACH MANTLES

Registered **A.U.R.** Trade Mark.

SWEEPING REDUCTIONS

On the 1st of JANUARY, 1905,

IN THE PRICES OF

WELSBACH "C" & PLAISSETTY MANTLES

TO THE GAS TRADE.

Welsbach Mantles are BRITISH MADE THROUGHOUT by British Labour, and carry the usual Warranty of replacement.

There are no Mantles so good as Welsbach.

WRITE FOR FULL PARTICULARS OF NEW PRICES.

THE

WELSBACH INCANDESCENT GASLIGHT CO., LIMITED,

2 to 14, Palmer Street, WESTMINSTER, S.W.

Telegrams: "WELSBACH, LONDON." *Telephone: 290 WEST.*

ARROL-FOULIS

PATENT HYDRAULIC MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS

SIR WILLIAM ARROL & CO., Ltd., Sole Makers,
DALMARNOCK IRON-WORKS, BRIDGETON,
GLASGOW.

LONDON ADDRESS: 32, VICTORIA STREET, WESTMINSTER, S.W.

PLANS AND ESTIMATES FURNISHED ON APPLICATION.

THE ARROL-FOULIS MACHINES Are Employed at the following Works—

GLASGOW GAS-WORKS—
Tradeston.
Dawsholm.
Dalmarnock.

GASLIGHT & COKE COMPANY—
Beckton.
Shoreditch.
Bromley.

SOUTH METROPOLITAN GAS COMPANY—
East Greenwich
Vauxhall.
Rotherhithe.

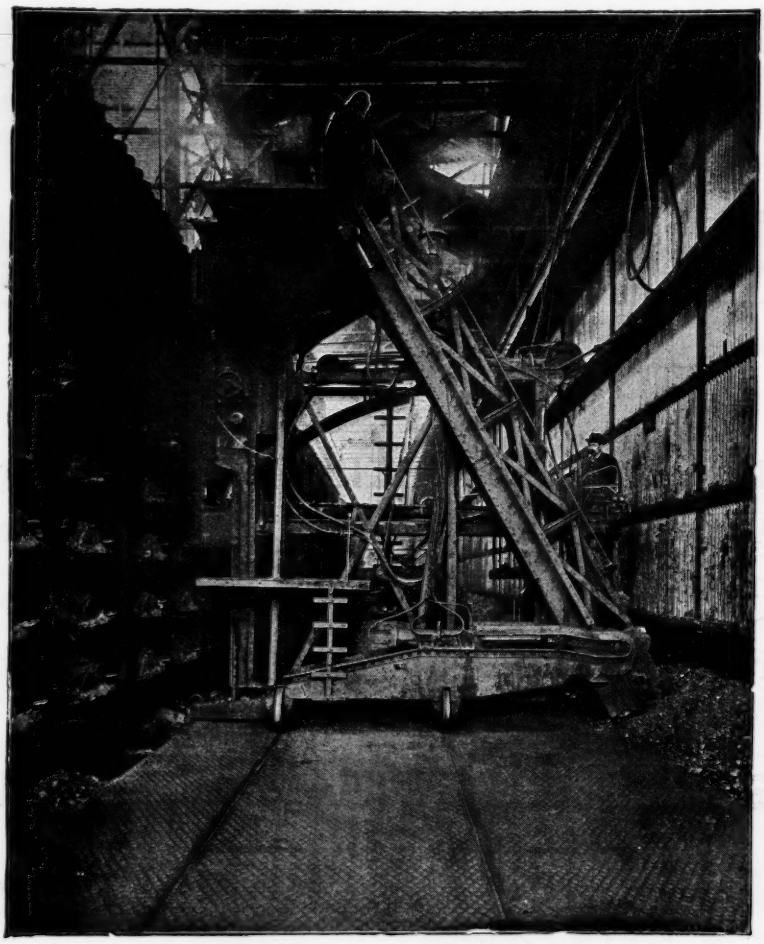
COMMERCIAL GAS-WORKS—
Wapping.
Poplar.

BROMLEY GAS-WORKS (KENT).

EDINBURGH GAS-WORKS.

LIVERPOOL GAS-WORKS.

BRIGHTON GAS-WORKS.



ROTHERHITHE GAS-WORKS.

THE ARROL-FOULIS MACHINES Are Employed at the following Works—

LEEDS GAS-WORKS.

BIRMINGHAM GAS-WORKS.

BRITISH GAS CO.—
Hull.

BOLTON GAS-WORKS.

IMPERIAL CONTINENTAL GAS ASSOCIATION—
Amsterdam.
Vienna.
Berlin.

HAGUE CORPORATION GAS-WORKS—
Hague.

METROPOLITAN GAS-WORKS—
Melbourne.

CLEVELAND GAS-WORKS—
Cleveland, Ohio,
&c., &c., &c.

NEARLY 300 MACHINES ARE AT WORK OR IN COURSE OF CONSTRUCTION.

THE TIME TAKEN TO DRAW AND CHARGE EACH RETORT BY THESE MACHINES AVERAGES

UNDER ONE MINUTE.

WOLFF-LIGHT INVERTED LAMP.

A perfect inverted Incandescent Lamp—No Carbonizing—Marvellous Durability, Intensely Brilliant Light at a reasonable price. Extraordinary Demand. Gives about 130 c. p. light. Consumes about 4 cubic feet of Gas. Fitted with Bye-Pass Gas and Air Regulator. Call and see it and you will be convinced.

The well-known **CROWN Mantle.**

Popular by Merit.

27/- Gross net.

10/3 Each net.

No. 321.

THE **CILCO Mantle.** New Secret Process.

Best Double-Ply Ramie Thread.

30/- Gross net.

SPECIAL TERMS TO GAS UNDERTAKINGS.
Illustrated Lists Free on application.

THE
CROWN INCANDESCENT LIGHT CO.,
112, Newington Causeway, LONDON, S.E.

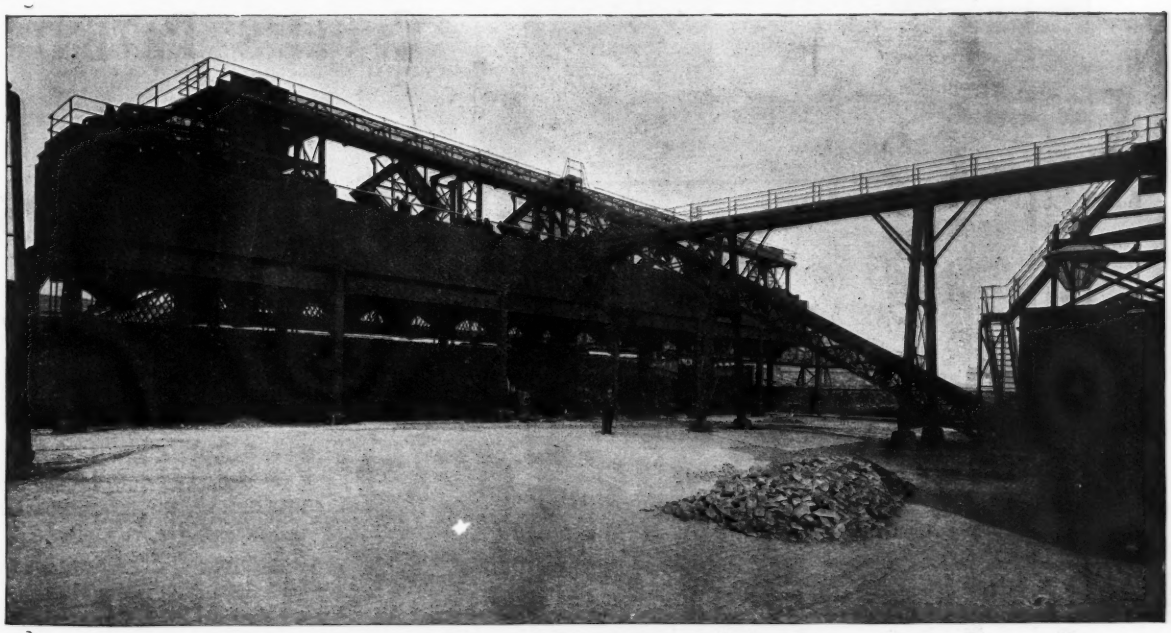
Telegrams: "CROWNALITE, LONDON." Telephone No. 7365 Central.

Gasholders
Retort Fittings Complete
PURIFIERS
Scrubbers
MAINS
Condensers
Ammonia Recovery Plant
STEEL TANKS
Washers
VALVES
STEEL STRUCTURES

COPYRIGHT

ASHMORE, BENSON, PEASE & Co. LTD. STOCKTON-ON-TEES. Tels Gasholders

THE
DE BROUWER PATENT HOT COKE CONVEYOR
GUARANTEED BY SOLE MAKERS.



SALFORD CORPORATION GAS-WORKS—ALBION STREET WORKS.

W. J. JENKINS & Co., LIMITED, RETFORD.

KIRKHAM, HULETT, & CHANDLER, LIMITED,

PATENT "STANDARD" COMBINED CONDENSER & SCRUBBER.

Slow Speed, Large Area for Gas, Water, and Liquor. High Strength Liquor obtained.

PATENT "STANDARD" TAR-WASHERS.

Easy access to Interior without disturbing the Connections, small ground area required.

International Gas Exhibition Exhibit at Earl's Court, Nov.—Dec. 1904.

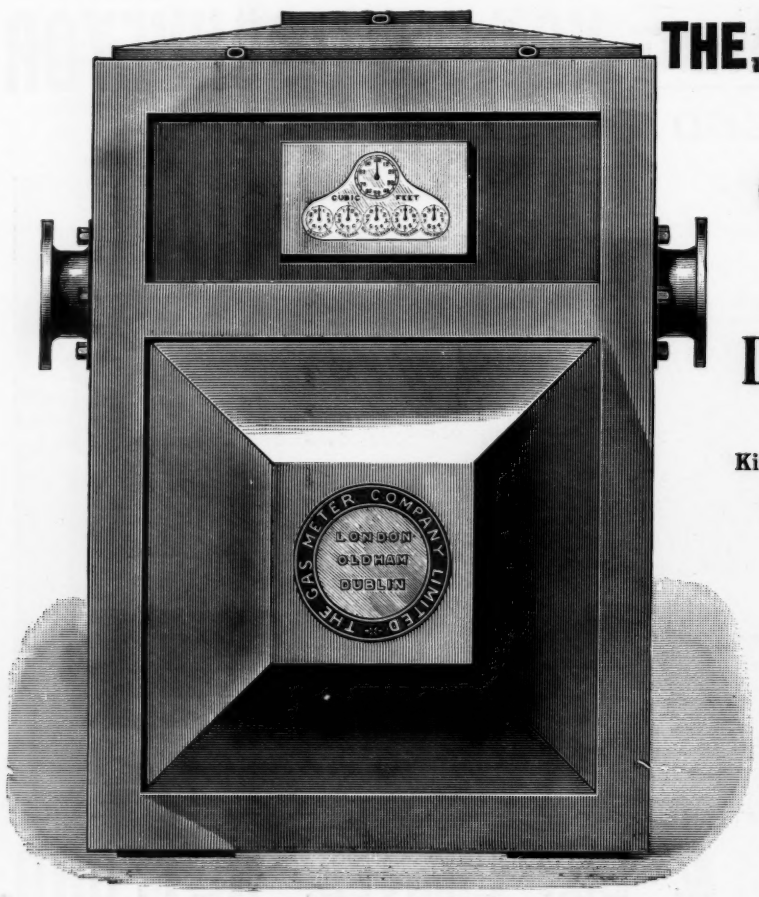
PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS

MILTON HOUSE WORKS EDINBURGH.

LONDON. —— LEEDS. —— GLASGOW.



THE GAS METER CO.,

LIMITED

CROLL'S PATENT IMPROVED DRY GAS-METERS.

ALL SIZES IN STOCK.

Kindly give us a call at STAND No. 54, Queen's Palace, International Gas Exhibition.

For Prices and Particulars apply to—

WORKS: 238, KINGSLAND ROAD, LONDON;
UNION STREET, OLDHAM;
HANOVER STREET, DUBLIN;
20, FENNEL ST., MANCHESTER.

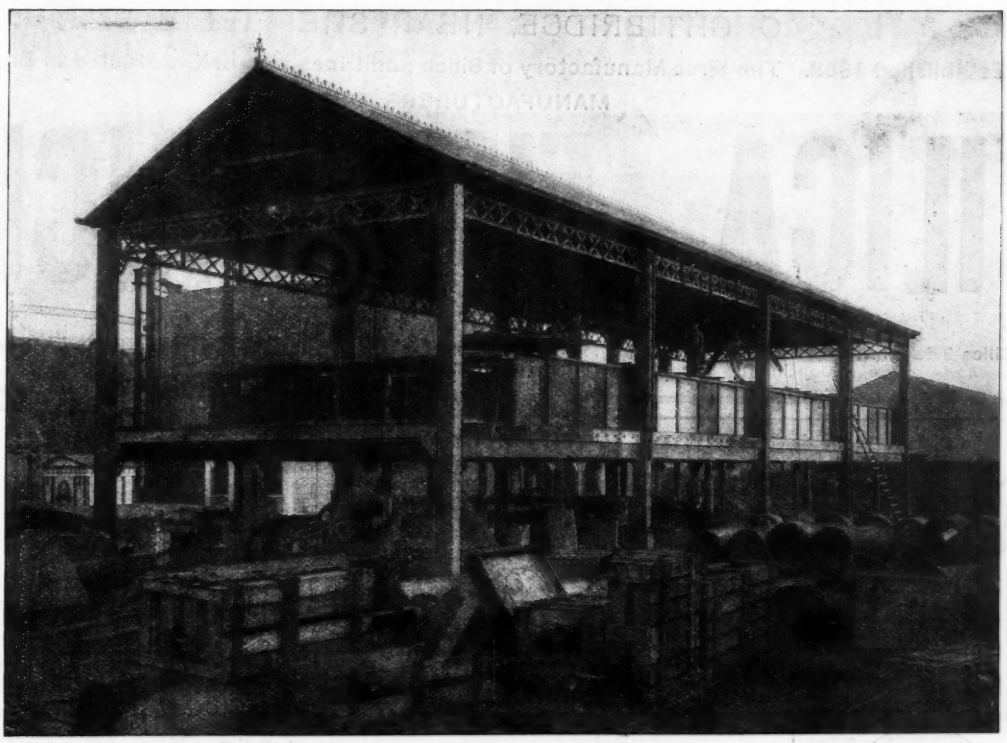
Telegraphic Addresses: "METER LONDON." "METER OLDHAM." "METER DUBLIN." "METER MANCHESTER."

Telephone Nos. 142 DALSTON (National). 340 OLDHAM (National). 1995 DUBLIN (National). 2918 MANCHESTER (National).

ARDEN HILL & Co's
"ACME"
GAS FIRES

"ACME" WORKS, BIRMINGHAM.

DRAKES LIMITED, HALIFAX.



WE RECENTLY ERECTED THESE 4 PURIFIERS 30 FEET SQUARE, WITH SUPERSTRUCTURE ROOF AND OXIDE ELEVATOR AND CONVEYOR.

Now Ready, pp. 584 & XVI. 251 Illustrations. F'Cap. Quarto, Price 18s. net (Post Free).

THE SEVENTH EDITION OF

NEWBIGGING'S HANDBOOK

FOR GAS ENGINEERS AND MANAGERS

(DEDICATED TO SIR GEORGE LIVESEY).

The Work has been revised throughout, and contains 40 pages of Letterpress and 12 Illustrations more than the last Edition.

In almost every department additions have been made; and it is believed that the labour bestowed on its production will enhance the value of the book as a Work of Reference.

Orders may be sent through any Bookseller, or direct to the Publisher,

WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

STARTLING INVENTION!

Carborundum Bricks, Carborundum Crucibles, &c.

DR. ENGELS' PATENT CARBORUNDUM COATINGS

For Lining GAS-GENERATORS.

For Lining and Repairing GAS-RETORTS.

For Metallurgical and Chemical purposes, Furnaces, and Firing Plants of all kinds.

The Fire-Proof Products Co., Ld.

Representative: **Richard Cremer,**

CIVIL ENGINEER, WOODHOUSE LANE, LEEDS.

MECHANICAL COAL HANDLING PLANTS

OF ANY MAGNITUDE

MADE AND ERECTED BY

GIBBONS

BROTHERS LTD

DUDLEY & LONDON

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, NEAR SHEFFIELD.

Established 1858. The First Manufactory of Silica and Dinas Fire-Bricks erected in England.

MANUFACTURERS OF

SILICA FIRE-BRICKS

TRADE MARK "SILICA."

Our Silica Bricks have gained a high reputation for Unsurpassed Quality in most of the leading Firms in England and on the Continent. Export orders delivered Liverpool, Hull, Grimsby, or the Tyne.

GENERAL HEATING & LIGHTING CO., LTD.,

(MOELLER'S SYSTEM),

26, VICTORIA STREET, LONDON, S.W.

MOELLER'S BURNERS

MAINTENANCE SIMPLIFIED.

Nothing to Corrode. Nothing to Choke.

Nothing to get out of Order.

Made in 4 Sizes consuming 3, 4, 4½, and 6½ feet. In Brass or Nickelled.

PRICE LIST ON APPLICATION.

CONTENTS.

EDITORIAL NOTES.

GAS, &c.—
The Half-Yearly Meeting of the Gaslight and Coke Company 341
Progress of Gas Consumption in the Suburbs of London 342
The Municipalization of the Paris Gas Supply 342
The Proposed Institution of Gas-Works Contractors and Manufacturers . . . 343
Commercial Morality 343
The Question-Box—A Company Engineering Association—An Advantageous Offer—The Cost of Lighting Aldwych . . . 344
WATER AFFAIRS—
Water Supply to Tenement Houses. . . 345

ESSAYS AND REVIEWS.

Gas Stock and Share Market 346
Electric Lighting Memoranda 346
The National Well-Being 347
The Progress of the Competitor 348
Naphthalene Treatment at Leicester . . . 350
Metropolitan Gas Companies and the Port of London Bills. 350
Workshop Practice in America and England 350
The Lady Lecturer and Teacher 351
Train Lighting by Means of Incandescent Gas-Burners 354
For and Against the "Dowser" 355
British Progress in Municipal Engineering . 356

TECHNICAL RECORD.

The "Khoma" Gas-Lamp 357
Manchester and District Junior Gas Association 358
Studies on the Claus Kiln Reaction . . . 358
Thorium Minerals in Ceylon 360
Coloured Sulphate. 360
American and Canadian Pumping-Engines . 361
Water Filtration at Philadelphia 362

COMMUNICATED ARTICLES.

The Development of Purifying Plant—A Few Notes on Jäger Grids. By John C. Belton 352
Systems of Testing Illuminating Gas. By "Critic" 357

REGISTER OF PATENTS.

Disc Water-Meters—Thomson, J. 363
Discharging Gas-Retorts—West, J. . . . 364
Prepayment Gas-Meters—Wilson, G. . . . 364
Generators for Producing Water Gas and Generating Steam—Neuman, F.. . . . 365
Liquid Meter—Hillner, T. 365
Patent Notices 366

CORRESPONDENCE.

The Naphthalene Question 366

LEGAL INTELLIGENCE.

High Court of Justice—King's Bench Division—Ocean Accident and Guarantee Corporation, Limited, *v.* Ilford Gas Company . . 366
Fraudulent Interference with Gas-Fittings . 367
The Bankruptcy of Mr. Ellis Lever . . . 367
Disputed Charge for Water 367

MISCELLANEOUS NEWS.

Brentford Gas Company 368
South Suburban Gas Company 368
Bristol Gas Company 368
London Borough Councils and the Gas Bills. 368
Gaslight and Coke Company 369
Public Lighting in Marylebone 371
The Public Lighting of Canterbury . . . 371
West Bromwich Gas Undertaking 372
Labour Trouble at the Neath Gas-Works. . 372

MISCELLANEOUS NEWS (*continued*)—

Sales of Stocks and Shares 372
Metropolitan Water Board 372
Assessing the Cost of Water-Mains . . . 373
Stock and Share List 373
Water Supply to Tenement Houses . . . 374
Leeds New Water Scheme—Work to be Done by Contract 374
Notes from Scotland 375
Current Sales of Gas Products 377
Coal Trade Reports 378

PARAGRAPHS.

Mr. Braidwood Reminiscent 345
Manchester District Institution of Gas Engineers 351
Analysis of Accounts of Gas Undertakings . 353
Personal. 356
Expenses of Councillors Attending Congresses—London County Council Electric Lighting Loans—Another Electric Light Failure in Liverpool—Extensions at the Beccles Gas-Works. 366
Wrexham Gas Bill—Fire at the Ryde Gas-Works—The Otley Gas-Works Purchase Question—Danger of the Electric Light for Operating Rooms—Double Gas Poisoning Fatality in Belfast 372
Shortage of Water at Leicester 373
Three Men Suffocated in a Well—Water Supply of Colwyn Bay 378
Pittsburg in Darkness—Improvements at the Oxford Water-Works—English Pipes Cheaper than Foreign—National Gas-Engine Company, Limited—Another Gas-Works Purchase Scheme Negatived by Ratepayers—London County Council and the Metropolitan Gas Bills—Bilston Water Supply—Birmingham Gas Department and the Supply of Out-Districts 379
Leakage of Gas into Dwelling-Houses—The Gas Suffocation Case at St. Leonards—Lighting of Aldwych and Kingsway . . . 380

Messrs. HUMPHREYS & GLASGOW

AND

THE UNITED GAS IMPROVEMENT CO., U.S.A.

CARBURETTED-WATER-GAS PLANT

— *DOUBLE-SUPERHEATER SYSTEM.* —

H. & G., LONDON **152,400,000** Cu. Ft. Daily

U. G. I. CO., U.S.A. **434,700,000** Cu. Ft. Daily

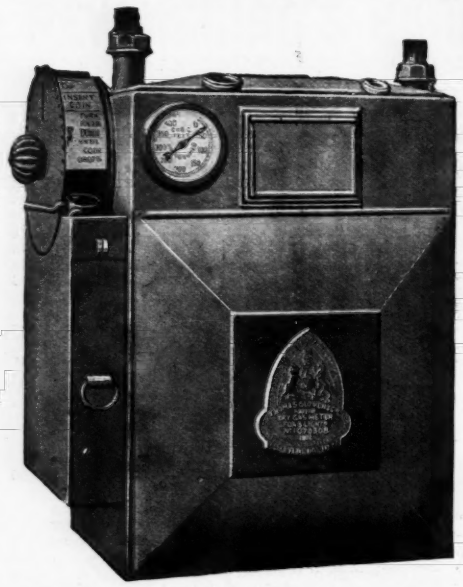
TOTAL 587,100,000 Cu. Ft. Daily

Messrs. HUMPHREYS & GLASGOW,
38, Victoria Street, London, S.W.
31, Nassau Street, New York.

THE UNITED GAS IMPROVEMENT COMPANY,
Philadelphia.

Telegrams { "EPISTOLARY, LONDON."
"HUMGLAS, NEW YORK."

THOMAS GLOVER & CO.'S PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

THOMAS GLOVER & CO., LTD.,

GAS-METER MANUFACTURERS,

LATE OF CLERKENWELL, NOW 49, QUEEN VICTORIA STREET.

Telegraphic Address: "GOTHIC, LONDON." Telephone No. 6159 Bank.

BRISTOL:	BIRMINGHAM:	MANCHESTER:	GLASGOW:	BELFAST:	MELBOURNE:
28, BATH STREET. *Telegraphic Address:* "GOTHIC." Telephone No. 1008.	57 & 58, BROAD STREET. *Telegraphic Address:* "GOTHIC"	122 & 134, CORN EXCHANGE BUILDINGS. *Telegraphic Address:* "GOTHIC." Telephone No. 3896.	26, WEST NILE STREET. *Telegraphic Address:* "GASMAIN." Telephone No. 6107 Royal.	8, EXCHANGE PLACE, DONEGALL STREET. *Telegraphic Address:* "GOTHIC."	23, WRIGHT'S LANE, LONSDALE STREET, Telephone No. 3716

PARKINSON'S DRY METERS

ALL SIZES KEPT IN STOCK.

PARKINSON AND W. & B. COWAN, LTD.
(*Parkinson Branch*).

COTTAGE LANE, CITY ROAD, LONDON. | BELL BARN ROAD, BIRMINGHAM.

JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. LXXXIX., No. 2178.—TUESDAY, FEBRUARY 7, 1905.

EDITORIAL NOTES—GAS, &c.

The Half-Yearly Meeting of the Gaslight and Coke Company.

As was to be expected from the statement of accounts, which shows that, for the time being, at any rate, an end has come to overflowing balances of profit, the shareholders who attended the meeting on Friday were in a somewhat chastened mood. Not, however, that the Directors had any reason to be dissatisfied with the reception which was accorded to them, for there was every disposition on the part of the meeting to make full allowance for the change of circumstances that has taken place since the last meeting at Horseferry Road. One shareholder did, in blissful ignorance of the provisions of the sliding-scale, desire to know why so large a balance as £248,193 was to be carried forward, instead of being divided among the proprietors; but this interrogator was easily appeased. In fact, the meeting, lulled by the eloquence of Mr. C. E. Jones, would have been entirely uneventful, but for the intrusion of Mr. A. M. Paddon. This gentleman seemed to have come to the meeting charged with anathemas to hurl by implication at those offending companies who, by not using carburetted water gas, are, in his opinion, responsible for the depressed state of the coke market. This is scarcely in the best of taste on the part of one who spent some years in the service of a firm who are suppliers of carburetted water-gas plant, and is amazing in a gas director, almost the least of whose qualifications should be a knowledge of the laws which govern the value of any commodity. Moreover, it adds to the gratuitous nature of the attack that, only a few minutes previously, the Governor had, in his address, reminded his audience of his prediction at the last half-yearly meeting, of the imminence of lower prices for this residual, owing to the slackness of trade, which, as regards the cement manufacturers, who are the Company's best customers for coke, still continues. Mr. Paddon's remarks drew upon him a well-merited rebuke from the Governor in his reply.

Mr. Paddon's pose as representative of Suburban Gas Companies was about as effective as his tilt at the sliding-scale. This is far too firmly established to take hurt by anything he may say against it; but surely he was a little ungrateful in finding fault with a system which, down to 1898, had put an additional sum of £2,317,859 into the pockets of the shareholders of this very Company, and still enables them to divide 8s. per cent. (with a prospect of increase) over and above what they would have been entitled to under the system of maximum dividends so much admired by Mr. Paddon. And if it does happen occasionally that a sliding-scale company cannot increase their dividend immediately after they have reduced the price of gas, how are they any worse off in this respect than if they had no claim at all to an increase in the rate of dividend under any circumstances whatever? "But," says Mr. Paddon, "the public do not like the sliding-scale." This we do not believe. It may be news to Mr. Paddon that the Select Committee on Metropolitan Gas in 1899 placed on record their opinion of it as follows: "This "arrangement"—*i.e.*, the sliding-scale—"has, on the whole, "had an excellent effect upon the companies, and has given "them a strong motive to keep down the price of gas, and "has also operated to the advantage of the consumers." Well may Sir George Livesey say: "I am quite satisfied "with having been the author of the sliding-scale;" but how Mr. Paddon can find it consistent with the views he has now publicly expressed to continue a Director of a sliding-scale Company, is known only to himself. One who is antagonistic to it cannot possibly be a proper administrator of it.

The Governor mentioned in his speech that the quinquennial valuation of the undertaking for rating purposes would be made this year, and that no effort would be spared to obtain some relief from the exceedingly heavy burden upon the Company in the shape of rates, now amounting to 3·3d. per 1000 cubic feet; and also that various Bills in Parliament would be opposed in the Company's interest. Those that related to the Port of London might serve to impose rates upon merchandise imported into the river, including coal, and would be a serious thing for the Company. An inquiry from Mr. Jones elicited the information that a part of the increase in the cost for distribution arose from the discontinuance of manufacture at one of the stations, which necessitated the transfer to distribution of any charges temporarily incurred there. It was explained that the large capital expenditure under the same heading was mainly owing to the acquisition of additional customers; there having been an increase of 14,948 automatic meter consumers and of 2377 ordinary consumers. It may not, however, be without significance that, as regards the two halves of the year just ended, the largest capital expenditure on distribution coincides with the smallest increase under this heading in revenue charges, and *vice versâ*. No further information was given with regard to the "special" efforts which are stated to have been made by the Company in connection with the International Gas Exhibition; but the Governor's demonstration of the switch system for lighting and extinguishing gas from a distance may perhaps be regarded as an outcome of the latter. Some burners in the hall had been fitted for the purpose; and these were lighted and extinguished by pressing a button fixed in convenient proximity. He rightly claimed for this that it placed gas on an equality with the electric light, which can be turned on and off from a distance without the aid of matches or tapers. Mention was made of the establishment of a superannuation fund for the officers of the Company, which is now in operation. To this fund—to which £25,000 has been transferred as a nucleus from the contingent account of the officers' guarantee fund—the officers contribute 3 or 4 per cent. per annum of their salaries, according to age; the Company adding thereto a sum equal in amount to that contributed by each member, in addition to which the fund is to accumulate in the hands of the Company at the rate of 5 per cent. per annum. As explained by the Governor, an officer having attained the age of sixty years, and having served the Company for forty years, will be entitled to retire on a pension equal to one half of his salary at the time of retirement. This does not appear to err on the side of liberality, seeing that a service of forty years has usually carried with it a pension of two-thirds the final salary. Compulsory retirement is provided for at the age of sixty-five. It is to be presumed that the benefits provided for in the rules are guaranteed by the Company. The fund is to be managed by a Committee consisting of the Governor of the Company, two other Directors, the General Manager, Secretary, and Accountant, with power to add to their number two others, either Directors or members. The engineering staff, it is to be observed, are not represented on this Committee.

At the extraordinary meeting which was held at the close of the ordinary business, the provisions of the Joint Bill which has been deposited by the three London Companies were considered and approved. The Governor, in explaining these provisions, referred to the Bill which had been promoted by the London County Council for the same object, describing this as unnecessary and a waste of money, since the objects sought by that body could have been promoted quite as effectively by opposition to the Companies' Bill. The proposal to reduce the Companies' standard prices by 1d. he very naturally denounced as being contrary to the view of the Departmental Committee. This would have the strenuous opposition of the Companies, as being unjust to them, after so recent a settlement had been come to.

As was remarked by Sir George Livesey afterwards, the standard prices of all three Companies have been revised within the last five years, which makes the proposal of the London County Council wholly unacceptable. The Governor concluded by saying that there were so many points of agreement between the two Bills, that there ought not to be any serious difficulties in the way of an agreement between the Gas Companies and the Council. In this expression of opinion Sir George Livesey concurred, and expressed his gratification that the three Companies are cordially working together in this matter. It is greatly to be hoped, therefore, that an agreement will be come to by which the necessity of an expensive contest may be avoided.

Progress of Gas Consumption in London Suburbs.

THE quantity of gas distributed by the three Metropolitan Companies, amounting in the aggregate to something like 35,000 million cubic feet per annum, is so vast that it is difficult to realize that this does not by any means exhaust the capacity for consumption of the area over which London has spread itself. The Suburban Companies distribute between them nearly 9000 million cubic feet; and this consumption is increasing at a greater rate than that within the Metropolis itself. This is to be accounted for by the spreading outwards of the population, encouraged by increased travelling facilities in the shape of tramways and local train services. Especially is the extension of building noticeable in middle-class districts, such as that which is served by the Tottenham and Edmonton Company, where the gas consumption has advanced by leaps and bounds during the last few years. It is apparent also, though to a less extent, in such districts as those which form the areas of supply of the Brentford and South Suburban Companies.

The report and accounts of the first-named Company for the half year just ended show that there has been an increase in gas consumption of 3·81 per cent., or nearly double that obtained for the same period by the Gaslight and Coke Company; while, over a longer period, the difference in the rate of increase of these two Companies is still more marked. During the last five years, for example, the Brentford Company have added nearly 28 per cent. to their consumption; whereas the Gaslight and Coke Company have lost ground to the extent of about 2·5 per cent. The first-named Company are now supplying 14-candle gas at 2s. 9d. per 1000 cubic feet, which is 2d. less than the price charged by the Gaslight and Coke Company for 16-candle gas. It was reduced to this figure in the early part of last year; but, notwithstanding this substantial reduction, and contrary to the experience of the two principal Metropolitan Companies, more than sufficient profit has been earned for payment of what have come to be regarded as the customary dividends, these having undergone no change for a considerable number of years. It is to be presumed that it is intended to continue the practice of adding to the reserve fund the extra half per cent. which might be legally divided, since no mention is made of increasing the dividend to this extent. It would therefore be scarcely surprising if the question of dividend, which was raised at the last half-yearly meeting, should be again mooted at the forthcoming meeting. The balance of profit to carry forward, after providing for the dividend, is a large one; and there is a good reserve fund, besides which the Company have very wisely set aside large sums for depreciation. The undertaking is in an exceptionally strong position, on which the Directors are to be congratulated. At the same time, there is a possibility of higher prices both for coal and oil; and the market for residuals—coke and tar products—continues weak. These circumstances have no doubt suggested to the Directors the desirability of exercising caution in the disposal of profits.

The South Suburban Company's report and statement of accounts are also satisfactory, inasmuch as they show that the profit earned is more than sufficient to pay the full statutory dividends, notwithstanding the reduction of 1d. per 1000 cubic feet, which was made last Midsummer, in consequence of the abandonment of lime purification and enrichment with carburetted water gas, and in respect of which no additional dividend is claimed. The accounts will be scanned with interest for any indication of financial change resulting from the discontinuance of carburetted water-gas manufacture. Apparently the reduction of 1d. per 1000 cubic feet has not been fully compensated for by savings effected as the result of the changes which came into operation last July. Conclusions, however, which are based upon the results of a single half-year's working are more likely than not to be misleading. The full effects of the policy which has now been adopted by this Company cannot become immediately apparent. It is sufficient to know in the meantime that this policy is the same as that which has been pursued with conspicuous success by the South Metropolitan Company; and there is no reason at all why it should not be equally successful in the case of this Company. The report refers to the Bill which the Company are promoting with the object of obtaining freedom from the necessity to enrich their gas, and also the repeal of the sulphur clauses in the Acts of 1873 and 1893. This is referred to as the third attempt of the kind; and the hope is expressed that it will, by being successful, be the last. The many well-wishers of the Company will cordially echo this hope—not for the sake of the Company only, but for that also of the veteran Chairman, who has so strenuously fought the battle of freedom for the whole gas industry, and now sees victory almost within his grasp.

The Municipalization of the Paris Gas Supply.

IN the "JOURNAL" for the 1st of November last we recorded the latest stages in the progress of the scheme for the municipalization of the gas supply of Paris, to sanction which, as well as the raising of a loan of 120,000,000 frs. for the acquisition of the undertaking of the Gas Company on the expiration of their concession at the close of the present year, a Bill had just been passed by the Chamber. This, however, was only half the battle. The Bill had to pass the Senate before it could become law, just as in England every measure has to undergo the scrutiny of the two Houses of Parliament. Opinions differ as to the necessity for this double investigation. On the one hand there are those who clamour for the abolition of the House of Lords; while on the other the existence of that sedate Chamber is considered to be in the highest degree necessary for the framing of legislation which will be just to all parties, and for the general well-being of the country. The Senate is regarded in very much the same light by our neighbours across the Channel. On the question of the gas supply the *vox populi*, as represented in the Municipal Council and the Chamber of Deputies, has been raised in favour of municipalization; but another voice is making itself now heard in the Senate. On reaching that Chamber, the Bill was referred to a Committee, who have lately reported upon it; but, according to the Paris Correspondent of the "Financial Times," they have expressed a very qualified opinion upon its proposals. While admitting the principle of municipalization, they are opposed to the *régie directe*—in plain English, the first-hand management of the gas-works by the Municipality. It is interesting to note the reason assigned for this attitude. The Committee state frankly that if the system alluded to is adopted, it must, in the case of certain administrations, "become an instrument of politi-" cal influence and electoral corruption;" and they consider that the growing spirit of officialdom in everything will, if allowed to develop unchecked, kill what remains in Frenchmen of "civic strength and independence." But this is not all. The Committee go on to say that waste appears to be inherent in all undertakings which are directly managed by publicly elected bodies, and is almost invariably the consequence of "neglectful management and irresponsibility." In short, direct municipal management means, according to them, indifferent public service at increased cost.

This is a very different view of the matter from that taken by the city authorities, who estimated that they would make a net profit of 18,000,000 frs. per annum out of the gas supply. The Committee are much less sanguine, as they put it, on the calculations of the Chief Gas Engineer, at about 10,000,000 frs. less; and on top of this they have the temerity to declare that the proposed loan, large as it is, will be insufficient to carry out the scheme. They, however, do not confine themselves to destructive criticism, but conclude their report with a proposition. It is that the Municipality should be allowed to borrow 100,000,000 frs. only for the purchase of the works and plant; leaving for subsequent settlement the question whether it will be best to "farm" the service for a certain number of years, or arrange with the existing Company to carry on the works under a lease, conditionally upon making some concession

to the consumers in the shape of a reduction in the price of gas, and handing over substantial amounts to the municipal exchequer. This would, no doubt, be a very satisfactory arrangement, from the point of view of the new owners of the works. But what would the Company say to it? Our financial contemporary's correspondent looks at the question from their side, and shows that they are rather in a position to dictate terms than to have them imposed. The present concession is within eleven months of expiration, and no definite arrangements have yet been made for ensuring the uninterrupted continuance of so important a public service as that of the supply of light to the city. Imagine the position of London with a Bill of the County Council still awaiting consideration in the House of Lords to take over the works of the three Gas Companies at the end of the year! A period of eighteen months was not considered too long for making the necessary preparations for the transfer of the undertakings of the London Water Companies, even when they were accompanied by the large staff of highly-trained officers who had had the practical management of them. Unless the authorities in Paris bestir themselves, they will find they are in a dilemma from which extrication will be most difficult without the assistance of the Gas Company. This, there is no doubt, would be readily rendered—on terms. What would be their nature one can only surmise; but presumably they would include a renewal of the concession on conditions to be subsequently arranged. The Municipality are in an awkward position; but it seems to us that there is a way of escape for them without any sacrifice of dignity, and possibly—although we do not for a moment endorse all the rather strong remarks of the Committee of the Senate with reference to municipal management—with advantage to the general body of the community they serve. We shall watch with increased interest the next steps in the direction of solving this troublesome problem.

The Proposed Institution of Gas-Works Contractors and Manufacturers.

When the manufacturers at the International Gas Exhibition, on the last day of that long-to-be-remembered display at Earl's Court, discussed the suggestion that they should have an Institution of their own of a character worthy of such an important section of industry as the makers and builders of gas plant and appliances represent, it was resolved that "all those concerned" in the question should be invited to attend a further meeting for the full consideration of the matter. "All those concerned" include every manufacturer of, and contractor for, the requirements of the gas industry from fire-clay goods to the gas-burner, as well as the makers of plant for working up the residuals. All such are now invited by Mr. Charles Clare, who was the Chairman of the Exhibitors' Committee, to the adjourned meeting to be held on Thursday, the 16th inst. at the Holborn Restaurant, at 2.15; and it is hoped that there will then be a large and representative assembly to ensure a full discussion, so that the verdict of the meeting for or against the proposal may be one that can be accepted as conclusive. It has been asked, of what use will such an Institution be? The only answer we are prepared at present to give is to be found in the articles in the "Journal" of Dec. 6 (p. 755), Dec. 13 (p. 824), and Jan. 17 (p. 149). It is also predicted that apathy on the part of gas-works contractors and manufacturers will kill the project. We trust the attendance at the meeting on the 16th inst., and the consideration then given to the subject, will prove that this is purely assumption on the part of a few who, for reasons of their own, prefer isolation to association. If the gas-works contractors and manufacturers say they cannot form, support, or have no need of, an organization of their own, or if sheer apathy permits the suggestion to sink without thorough discussion—if they agree that their organization would be of no avail in advancing the interests of the gas industry, we ask, Will that, or will that not, endorse the action of the Institution of Gas Engineers in confining their membership to managers and engineers occupying official positions in gas undertakings? Men who are unwilling to organize themselves, or who see no use in it, surely have no right to expect a place in any other organization That, however, by way of argument, for those who suggest that apathy will kill. As we showed in the article published on the 17th ult., the electrical contractors and manufacturers have seen the wisdom, and have proved the value, of not only organizing themselves, but of incorporating their Associations. If they, why not the gas-works contractors and manufacturers? We should like to hear the variety of answers that those interested would give to these questions. The discussion at the meeting on the 16th inst. will not, we understand, be reported, so that those who attend will be able to voice their views without trammel.

Commercial Morality.

In the cause of commercial purification, there has not been in latter times a sterner fighter than Sir Edward Fry, who during his high legal career earned for himself, by his conscientiousness and jurisprudential attainment, such celebrity and confidence that the country has been only too glad to avail itself, since his retirement from constant activity in public duties, of his services in matters of the highest importance. His intimate knowledge of men and the world's affairs commands respect for his views; and, when he says that there is a looseness, and a very general one, about the ethics of commercial transaction, all concerned in such matters—and who are not?—must pause and listen. Sir Edward sent for reading and consideration, at a meeting of the Society of Friends in York just recently, a paper on the subject; and in it he set forth the practices, with his comments thereon, which pollute the trade of the country. It is his earnest hope that some practical preventive and curative steps may be discovered and taken. He is not a fanatic. But he detects the weaknesses and the dangers of corruption in trading; and he calls to his aid honest men to see what can be done to restore to it soundness, by putting a staying hand on guilty intercourse which betrays employer and depraves employee. Where, with the weakling or avaricious, conscience is not sufficiently strong to restrain, one slip in wrong-doing of this kind is almost sure to have subsequent cumulative action. Sir Edward, it is known, is favourable to the tightening of the legal grip on both the giver and the recipient of bribes and commissions; but no one can recognize, no one does recognize, more than he that the law can only absorb a portion of the obligation of morality. The notion is sometimes held that whatever is not prohibited by law is permissible in morals; but that is, of course, a misconception. The law can never, or should never, be allowed to stand for the maximum of man's moral obligation to himself and his fellow-men. So spoke Sir Edward in his paper; and therein is seen the lawyer who is fully conscious of the fact that the law falls far short of affording to us the highest guiding principles—that there is something beyond it which should keep men well out of the reach of its penalties. But, in commerce, men so frequently drop below even the standard (if such it can be called) as defined by the law; and hence this crusade against commercial impurity by men of the stamp of Sir Edward. The impurity, thank goodness, is not universal, but it is widespread. And in this is one of the difficulties of those who wage the agitation for strengthening the arm of the law, and appeal to men's honour; for, in the very effort to work good, they may bring on the innocent and impeccable not only suspicion but harm. However, the canker exists; and without retarding and eradicating measures, it will continue to grow, as it has grown in the past.

We might well stay our hand, for the contents of the paper are common knowledge; but it is only by their repetition that they are kept in view, and their influence is assisted. Gifts by the purchaser to the agent of the seller, or by the seller or his agent to the agent of the purchaser, involve the attempt to serve two masters, and they are secret. On both accounts, they are bad; but the secrecy, in Sir Edward's opinion, is the greater evil. Again, if a master is cognizant of his servant receiving money, and consents to it, the servant cannot be said to rob the master. But the master may be justly said to wrong the servant, for the percentage tempts him; and no master has the right to be a party to the placing of temptation in the servant's way. He has no right to give occasion to a conflict between duty and the servant's interest in obtaining the largest amount of commission. Of course, the practice often rests on the offer of the bribe by the person who desires to ingratiate himself or his goods with the agent of the purchaser; but as frequently perhaps the bribe is demanded by the agent. Between these two forms of corruption, in point of morality, Sir Edward does not think there is much to choose. But of the two, probably

the latter is the more mischievous. On the effects of bribes, the author was most interesting; and he showed how completely he comprehended them. Perhaps nothing is more oppressive and cruel to the honest trader than the merciless practice of injuring the merit of his goods or plant, by word or act, through the fact that an influential servant of the purchaser has not had his interest or goodwill paid for. This, too, interposes great difficulty in the way of the introduction of new inventions. Only recently we heard from a large manufacturer of a class of goods of common use in connection with gas consumption of the insurmountable difficulty he had experienced in doing business with certain considerable buyers because he declined to appease the rapacity of their agents in a solid manner.

No one who examines this question in a frank and liberal spirit can accept the frequent excuse that commissions are taken without any idea of harm, and that the recipient is not biassed by the gift. "This," remarks our sentient author, "ignores the real point of the matter. To say "whether a bribe has or has not operated on the mind of "the recipient is a metaphysical inquiry which it is difficult "for a man himself to answer." But whatever shape the gratuity takes, it must have "a tendency to blind the eyes "of the receiver, to make him less vigilant for his master "than he ought to be, and to look with more favour on the "giver than on others who are not the givers of like gifts." There is no doubt, too, that the great complexity of modern businesses, and the increase in the part which agency fills in them, have materially fostered the system of secret payments. The subject is not a congenial one; but to notice the utterances of such men as Sir Edward Fry falls within the range of duties of those who have the highest public interests to serve. We enrolled ourselves long since in the ranks of those who seek to cultivate the spread in all ranks of sound, untainted dealing; and in this we have the sympathy of all who sell honestly and of all who buy without blemishing trust and manhood. Of such—we say it with a feeling of thankfulness—there are many in the gas industry; but "many" is not sufficient. The whole will only satisfy.

The Question-Box.

To the dilatoriness of the Customs House authorities or the Post Office, or both, as explained in a recent issue, must be charged the short time which was given for replying to the questions circulated by the Ohio Gaslight Association, and therefore also the responsibility for the small percentage of the recipients of the circulars who found an opportunity for sending in answers. There seemed, too, to have been some misconception as to what was required of those to whom the circulars were addressed; but this was due entirely to the fact that the paragraphs which have been published in the "JOURNAL" on the subject have not been attentively read. Certain correspondents seem to have been perfectly horror-struck when they saw the batch of questions; and apparently it did not occur to them that the list was intended to embrace a wide choice of subjects, so that they could select just those preferred, and as many or as few questions for reply as time or pleasure determined. The great variety of questions to which answers were given by even the few who did send in shows the wisdom of presenting a good range of inquiries from which to select. Altogether, the questions from the Ohio Association were addressed to upwards of 800 gas men in the British Isles; and we are fain to believe that the fact that only 39 replied is wholly due to the short time for reply which untoward circumstances caused, or to misunderstanding. But the 39 between them have to their credit 225 replies, which have been forwarded to Mr. Doherty. Of those who kindly answered, five replied to 1 question, five to 2, six to 3, five to 4, four to 5, three to 6, three to 7, one to 8, two to 9, one to 10, one to 12, one to 13, one to 18, and one to 34. We feel sure that there will be a larger result if, on the next occasion, a longer period is permitted for the interesting work. By that time, too, the arrangements will, in all probability, be in the hands of the various District Associations, in connection with the revision scheme which Dr. Harrop and his colleagues have in hand. Of course, it must be remembered, among the other extenuating circumstances applying to this occasion, that this form of technical work is quite new to British gas men; and that interest is bound to ripen with experience in it.

A Company Engineering Association.

This is an age of association and co-operation. Men in all departments of life, with collateral interests, acknowledge its value, and organize accordingly—not necessarily for aggressive or defensive purposes, but for the mutual help, knowledge, and pleasure that come from the intercourse of man with man. We have seen the name of Henry L. Doherty very much of late in the "JOURNAL;" but that has not been his fault—the publicity being accidental through his activity in Association work, in which he is an earnest believer. He realizes its broadening influence, and so much so that, we learn from an article by his Secretary (Mr. J. C. Andrews) in the "Progressive Age," he conceived the idea of forming a small engineering association among the employees of the Denver Gas and Electric Light Company. Ordinarily, the employees of the various departments and different stations of a large concern only have rare opportunities of meeting together, and of learning of the other branches of the work of the undertaking in which they are engaged. While the specialization of the men may be necessary to the highest success, at the same time it is well to have a general knowledge of the whole business, in order to attain to the highest excellence in specialization, and to bring the best intelligence of the men to bear on their own particular work. In the interests of the undertaking, too, which they serve, it is most important that the whole of the employees should know each other well, and should have opportunities of cultivating a greater interest in the affairs of the concern. But men cannot be brought together out of business hours without some definite and tangible object; and, we gather in reading Mr. Andrews' article, that considerations such as these led to the formation of the Denver Company's Engineering Association. The experience of the Association ripened the opinion that such an organization "opens the way for the really ambitious. Original investigation is stimulated, new thoughts and new lines of study are suggested, and, what is as important perhaps to a man's success as most things, the ability to get on his feet and express himself clearly before a number of men is fostered. He learns confidence in himself and his opinions." The Association held its first meeting in June last; and already there are 54 members. The list of papers that have been read is a substantial one, and embraces matters of first-rate importance. One plan of getting matter is this: Any member may hand in a written question upon which he desires information; and the Chairman settles it by simply naming the member who is most familiar with the subject to prepare and present an answer at the next meeting. The scheme has met with success. It may be remembered that the Junior Institution of Engineers in this country—now with a membership of over 800—originated in a single engineering works club.

An Advantageous Offer.

The Canterbury City Council are the possessors of an electric light undertaking; and they have recently applied for a further loan to enable them to carry out extensions, including the installation of additional public lamps. They are also at the present time considering the question of a new contract with the Gas Company, who have been adroit enough to offer to convert the whole of the street lamps lighted by gas to the incandescent system, without extra charge to the Council. They, however, naturally desire some guarantee that they will be afforded an opportunity of recouping themselves the outlay; and the condition was therefore laid down that not less than a certain number of gas-lamps should remain in use for a period of three years. Many of the members of the Council showed themselves fully alive to the advantage of the offer; and no doubt the feeling in favour of it would have been even more unanimous if it had not been for the existence of the municipal electricity works. This undertaking, of course, introduces an additional element into the calculations, though if it be the case that the public electric lighting is carried out at a loss, it merely adds one more argument to the others in favour of the acceptance of the Gas Company's proposal. The question has been referred to the Lighting Committee, who may be expected to give it the consideration it deserves; and if they do this, there is no difficulty in saying what their decision will be. But whatever may be the upshot of the matter, the Company are to be commended for the step they have taken in thus following the example of many other progressive

gas undertakings. As more than one of the councillors (with a wondrous display of wisdom) remarked, the offer is not a philanthropic one, but a purely commercial proposition. Certainly the Company are in business for profit; but this has nothing whatever to do with the superiority of incandescent gas over other forms of public lighting—which is the point the Committee have now to satisfy themselves upon. There are, we imagine, few easier tasks than choosing between this system and incandescent electric lamps lighted by the ratepayers themselves—at a loss.

The Cost of Lighting Aldwych.

In the course of some remarks at the last meeting of the London and Southern District Junior Gas Association, Mr. W. J. Liberty referred to high-pressure gas lighting, and instanced what was being done in this respect at Aldwych. Before deciding upon the system of illumination to be adopted for the thoroughfare, the City of Westminster invited tenders from the Charing Cross and Strand Electricity Company, the Metropolitan Electric Supply Company, and the Gaslight and Coke Company. The result, as readers are already aware, was the adoption of high-pressure gas lighting, which has given the greatest satisfaction. Mr. Liberty, in the course of his remarks at the Junior Association meeting, gave roughly the cost of the two systems tendered for—arc lights of nominally 2000-candle power (but in his experience much less) and high-pressure gas-lamps giving, he said, a well-diffused light of about 1000 candles—but as we have now the exact figures before us, it will be of interest to reproduce them. The Gaslight and Coke Company's tender for the lights which have been put up on the "Millennium" system was £20 per lamp for installation, and £15 10s. 5d. per annum for maintenance and supply of light. Both the Electric Companies quoted the same prices for arc lamps—namely, £45 per lamp for installation and £27 for maintenance and lighting. It will be seen, therefore, that the actual figures were even more favourable to gas than Mr. Liberty indicated; and there is no need (apart from the superiority of the light given by the gas-lamps) for surprise at its adoption for both Aldwych and Kingsway.

WATER AFFAIRS.

Water Supply to Tenement Houses.

In considering from time to time during the past quarter of a century the various questions bearing upon the water supply of the Metropolis, we have not very often, as our readers are aware, found ourselves at one with the London County Council. It is therefore with all the greater pleasure that we now record our entire concurrence with them in the action they have just taken in regard to the water supply to tenement houses. The circumstances which gave rise to that action will be found in the report presented to the Council last Tuesday by the Public Health Committee, the principal portions of which are given in another part of the "Journal." The subject had been before them for some months; for as far back as May last they brought to the notice of the Council the report by the Medical Officer of Health (Sir Shirley Murphy) on the result of an inquiry made by Dr. Young respecting the sanitary accommodation provided in houses originally built for one family, but now let out in separate tenements. One of the important facts disclosed in that report was the inadequacy of the arrangements for the supply of water to the occupiers of the upper floors; there being in most cases only a single tap, and that situated in the basement or on the ground floor. The question which had engaged the attention of the Committee was whether the provisions of the Public Health (London) Act, 1891, were sufficient to enable sanitary authorities to call upon landlords to provide a supply of water to the tenants of each floor in tenement houses; and special legislation on the matter was proposed. The project was, however, abandoned, in view of certain steps which were being taken to have a Magisterial decision on a test action brought by one of the Metropolitan Borough Councils. A very suitable one was found at Woolwich; and the result of the proceedings was a pronouncement from the Bench that a tap in a yard is not a "proper and sufficient" supply of water within the meaning of section 48 of the above-named Act, and the imposition of £5 5s. costs on the defendant, accompanied by an order to "abate the nuisance" in a month. The County Council last Tuesday decided to call the attention of the Borough Councils to the case, and expressed the hope that they would take all possible steps to secure the provision of a sufficient supply of water for the tenants of every floor of a tenement house.

The house in respect of which these proceedings were taken is only one of the large number to be found in various parts of the Metropolis. In the house at Woolwich, consisting of three floors and an unoccupied basement, there were in July last, when a lady Sanitary Inspector visited the premises, five families, or eleven persons; in December the number was reduced to nine. The only water supply was a stand-pipe in the yard, which was approached down three steps from the lowest occupied floor. The owners of such property are as desirous as the landlords of making as much as they can out of it; and so they spend as little as possible upon repairs. In fact, the dilatoriness with which appeals for "something to be done"—say to keep the rain from pouring through the roof and swamping the occupants of the top floor—are responded to, is in striking contrast to the promptitude with which application is made for the rent. Unfortunately, the conditions of life in London make tenement houses necessary; and it is not to be denied that in many cases families are brought up in them without any serious ill-effects. In far too many cases, however, dirt and defective sanitary arrangements are characteristic features. We are not sure that it would be practicable to affix a water-tap and sink on the landings of all these houses; but certainly it is the duty of the sanitary authorities to see that there is something more than a single tap in the back yard to furnish the residents with water. It is impossible to keep water clean if stored in an open pail; and it may even communicate the germs of infectious disease. The London County Council have for some years been lavish in their expenditure on analyses of London water, with the view of detecting the presence of a stray pathogenic microbe. If they had, while doing this, shut their eyes to such abominations as those disclosed at Woolwich, they would in very truth have been guilty, like the "blind guides" of old, of straining out a gnat but swallowing a camel. It will be greatly to the public advantage that they have not done so.

Mr. Braidwood Reminiscent.

"Progress" is the heading of a contribution to the February issue of the South Metropolitan Gas Company's "Co-Partnership Journal," by Mr. J. F. Braidwood, the Engineer of the West Greenwich station. In the course of it, he writes: Over forty years ago, a friend of mine, despite the then general opposition to anything of the kind, had all his food cooked by gas; and although friends did not hesitate to tell him that he would shorten his life and that of his family very perceptibly, it has proved to the contrary. His family have all grown up strong and healthy men and women; and he himself is now fairly well at considerably over eighty. When I was Assistant-Engineer at a large oil-works in Wales, in 1866, there was a considerable quantity of gas made which was not condensable, and was therefore used for lighting the works generally, by means of a gasholder, &c. I then used gas-fires in my house on the works, although the gas burnt was of the very best, being 32-candle power; but it was to us a waste product. My Company applied several times to the authorities for permission to light a neighbouring village with the gas, but were not allowed to. Hence what might have been a considerable source of income had to be wasted. I think this shows that gas fires and cookers have existed for a great many years, but have not until lately come to the front, owing to the prejudice against them, which now happily has been almost entirely overcome. When I entered the service of a London Company, which was afterwards amalgamated with the South Metropolitan, I took charge of the Bankside station under Mr. Corbet Woodall, in July, 1872. The rate of stokers' pay per day of two-shift work was 5s. 4d.; and the selling price of gas was 4s. per 1000 cubic feet for the inside portion of the district, and 4s. 6d. outside, or in the suburbs. This not unfrequently caused unpleasantness with the consumers, as a man living on one side of a road would be paying 4s., while another living on the opposite side would be paying 4s. 6d. Now, the stokers' pay per day of two-shift work is 7s. 1d., while the selling price is 2s. per 1000 cubic feet. Thus, it will be seen, the wages have increased about 32 per cent., while the selling price has been reduced over 50 per cent.—clearly proving, I think, that better and more economical work is being done; and this I consider is contributed to mostly by the co-partnership arrangement existing in this Company, which was inaugurated some fifteen years ago by our much respected Chairman, Sir George Livesey, and sanctioned by the Board. This has been the means of hundreds of men and officers alike having a considerable sum invested in the Company, which otherwise in all probability would not have been the case.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 373.)

THE Stock Exchange has had a rather disappointing week, so far as the volume of business is concerned, for things were very decidedly quiet. But, on the other hand, the quality was good. Most markets were strong, and hardly any weak; while the gilt-edged division were in excellent form. Certainly there were moments of sensitiveness when a bit of bad news from the East might have created a scare, but happily that bad news did not come. In the Money Market, there was a good demand at the end of the month, which eased away at its close; and discount rates were easier also. In the Gas Market, there was a decided reduction in the quantity of business done, transactions in almost every stock (more especially in the leading issue) being much fewer than the average of the past few weeks. The general tendency was favourable, although one of the choicest issues had a fall, as noted below. In Gaslight and Coke stocks the ordinary was not very strong, though it avoided a fall. The top price of the week, 99⅜, was marked at the opening, and the lowest, 98⅞, on Thursday. After this it improved; and 99½ was marked more than once before the close. Perhaps some of this brighter tendency was the result of the Company's meeting on Friday. In the secured issues, the maximum was done at 94 and 94½; the preference was active between 110¾ and 112; and the debenture changed hands once at 88¼. South Metropolitan was flat and lost two points. Here again the market suffered a disappointment in regard to the higher rate of dividend reckoned on. But a reduction of threepence in the price of gas represents a larger sum than the resultant increase of business can be expected to produce all at once, and upon a reduced revenue the declaration of an increased dividend would have been impolitic. The best price of the week was 133, and the lowest 130½. The debenture was done at 89. Business was very slack in Commercials, the 4 per cent. marking 118⅞ once, and the 3½ per cent. 114 once. The Suburban and Provincial group were extremely quiet; but they showed a disposition to rise. Alliance old was done at 22¼, and the new advanced in quotation. West Ham ordinary gained a point, and ditto preference changed hands at 124½. Brentford old marked 254, and Brighton original 230. British was done at 41¼ and 41½, and Lea Bridge at 120 and 121½. In the local Exchanges, Liverpool "A" and "B" and Newcastle debenture improved. The Continental Companies were quiet and strong. Imperial partially recovered, with business at from 210 to 211, and European was very firm at from 21½ to 22 for the fully-paid shares. Tuscan marked 9⅛. Among the more remote undertakings, Bombay shares advanced, with business marked at from 6⅛ to 6¼, and Oriental was done at 150. Buenos Ayres changed hands at 11¾, River Plate at from 12 5/16 to 12¼, and Monte Video at 10¾. Primitiva was done at 5⅔, ditto preference at 4⅞ and 4 15/16, and ditto debenture at 95. Cape Town preference marked 9⅞.

The closing quotations are shown, as usual, in our stock and share list on p. 373.

ELECTRIC LIGHTING MEMORANDA.

Still Wanted an Economical Lamp—The New Tantalum Filament—Generating Stations and Vibration Troubles—Electric Lighting Installations and Fires—Seeking Relief from Worry at Wimbledon.

FOR its deliverance from a struggle in which it stands in the unenviable position of second best, the electrical industry urgently require an economical incandescent lamp for interior lighting, which shall be able to compete with the incandescent gas-burner in lighting power, cost, and renewal expenses—that is to say, a lamp equivalent in economy from all points of view. We are reminded that for nearly twenty years the carbon filament incandescent lamp was the sole representative of glow lamp manufacture. Then came the Nernst and the Osmium lamps representing work in new directions, but the latter of which lamps can hardly yet be described as an advance. Now we are introduced to the "Tantalum" lamp, a product of the laboratory of Messrs. Siemens and Halske, and which has been duly introduced in a long paper, consisting of two parts, to one of the German Electrical Societies. The electrical industry has had so much disappointment in the past over the efforts to find a new material for the filaments of the lamps which are intended to give more economical results, that there has not been any great rejoicing over the news from Berlin. The references to it betray the caution of the writers. The new lamp "may," it is said, prove to be a departure of great importance; likewise, we remark, it "may" not. The paper referred to traces the history of the tantalum lamp from its genesis to the stage of development at which it is presented to us. It has a filament made of a metallic conductor, and burns at once on being connected without previous heating. The tantalum ore, it is stated, exists in considerable quantities, and can easily be procured.

The light-giving wire is prepared by melting in a vacuum and drawing. It is tough even in the cold state, and can therefore be coiled and fixed in the lamp when cold. One essential is that the tantalum must be perfectly pure; and the operation of securing this appears to be a somewhat tedious one. It is also seen that a relatively great length of the wire can be placed within a bulb of ordinary dimensions. The wire is fixed obliquely in sixteen straight pieces between two insulated supporting stars. But there is only reliability when the wires used in the same lamp are absolutely uniform in diameter and quality. Differing from most of the previous constructions, the central support consists of a short glass rod carrying two discs, into which the supporting arms, bent upwards at the top and downwards at the bottom, after the manner of umbrella ribs, are cast. The standard type for 110 volts, 25 Hefner candle power, and 1·5 watts per candle power has a filament 650 mm. long and 0·05 mm. diameter. It is computed that the lamp consumes about 50 per cent. less current at the same voltage, with the same intensity of light, as the carbon type; and its life is said to be several times greater. There are indications in the paper that the lamp is very sensitive to pressure, and often shows an early decrease in illuminating power, while, in other instances, the latter is shown to be constant, with luck, over a period of as much as 1000 hours. Other disadvantages are that, while the wire when new has a greater tensile strength than steel, it becomes brittle, and will easily break in the course of its life as a filament. When the lamps are once fixed, "do not touch" is the rule prescribed; otherwise disaster will most likely ensue. When the alteration in the filaments has occurred through use, it is well to preserve them from shocks. A lamp, too, is completely knocked out of service on a filament breaking unless contact can be restored by causing the broken filament to fall against the next one. From a study of the paper describing the lamp, one is disposed to think that the manufacture of the lamps is an expensive matter, and the risk of breakage considerable; and these two factors combined will not tend to make the lamp popular. The new comer will not produce any feeling of despair in the gas industry.

The occasional cases of "nuisance" of which one hears in connection with gas manufacturing operations are nothing compared with that of vibration to which generating-stations give rise, and which has proved such an expensive matter for several electricity undertakings. In the past, we have adverted to several cases, but not all. The great difficulty is that where the evil exists, the cure is, as a rule, a costly one—that is, if a cure can be found. The Dickinson Street generating-station has been a long and expensive trouble for the Manchester Corporation. The property owners have seriously suffered from the vibration, anathema has flowed freely, litigation has been entered upon, and in all cases but one the Corporation have adopted the excellent but money-absorbing process of settling the actions by buying out the owners. But in the one case they have got hold of an unsubmissive owner, who, only by having his heavy rent and costs secured to him, has allowed the matter to stand over, while the Corporation experimented. They have spent £3000 upon endeavouring to overcome the difficulty; and now after all they have to acknowledge that, with the present plant, nothing further can be done. They are proposing to try the effect of one further suggested remedy—this is, the replacing of two large engines by turbines. But the owner—a Mr. Barlow—became impatient of the delay, and had the Corporation before the Vice-Chancellor at the Lancashire Chancery Court last week. The outcome of the discussion by the lawyers was that it was agreed the trial of the action should stand over until next year, in order that experience might be gained with the new machinery during the heavy demand of the winter season; the existing undertakings to be continued in the meantime. If this kind of thing goes on much longer, the Corporation will begin to think that Dickinson Street was not a happy choice for the generating-station. Verily, the congenital and adventitious troubles of electricity undertakings are manifold.

Recent instances of fires generated by perplexing and unseen defects in interior electric lighting systems have been commented upon in the last two issues. In some interested quarters, there has been a discreet silence over these alarming incidents; but in other quarters, a desire has been evinced to ventilate the question of the prevention of such occurrences. The "Financial Times"—last of expected papers to accept correspondence on such a matter—has published a couple of letters calling special attention to the danger, and advancing remedies. One correspondent advocates non-inflammable wood for the casings of electric wiring. This is not a new idea; but it is spoken of here again. The same writer also urges that Parliament should pass a comprehensive Fire Prevention Act, the main provisions of which should be like those of the Public Health Act—compulsory. But it is a question whether the wood casings are as much to blame as the susceptibility to inflammability of the insulating material with which the wires are covered. The writer was once concerned in a fire which had its origin in an electric light installation; and it was very interesting to observe afterwards how in places the wiring had been completely denuded while surrounding woodwork was only charred on the surface; and it was also observed how these wires had assisted in transmitting the fire in the building in question. The second correspondent in our financial contemporary refers to this danger as being the more important, and points to the remedy being the use of a fire-resisting insulating substance. But he opines that there will have to be a very far-reaching series of catastrophes, due to fires in connection with electrical apparatus, before the wisdom is seen of absolutely preventing fire from attacking, and being fed by, such highly inflammable substances as the covering of electric wires in general use inside buildings. There is the rub—the

general use of such wires. Among the frailties of human nature is the one of being "penny wise and pound foolish;" and there are few users of electricity who, no matter how loud the tocsin sounds, will go to the expense of removing such a source of danger, and putting their property, and perhaps their own and families' lives, in safety.

In the "Memoranda" for Jan. 12, notice was taken of the discomfiture of the Wimbledon District Council over their electric light undertaking. Capital expenditure has been expanding there with most uncomfortable rapidity, yet breakdowns are not now among the unexpected incidents of Wimbledon life. The public lighting, too, is costing much more than neighbouring authorities are paying per mile of street for incandescent gas lighting; but still there are councillors and ratepayers who are unkind enough to think, and not only think but say, that their own public lighting is worse than the gas-lit streets of their neighbours. Under these circumstances, the Electricity Committee asked the Council to allow them to spend a few thousands more on plant, in order to assure the ratepayers at least of constancy in the supply of current. There are members of the Council who object to this, and would prefer to see some retrenchment by putting an end to electric street lighting, and utilizing the relief thus given to the generating plant for the better service of private consumers. The first discussion by the Council on the subject of the additions to the plant resulted in the matter being referred to the General Purposes Committee; and they have now reported their support of the Electricity Committee's proposals. It seems that anticipation of further breakdowns "did the trick" both in Committee and at the last meeting of the Council; and so the Electricity Department are to get their new plant. Whether this will end their troubles is another matter. It may be the ratepayers will now, after the further outlay, look for a decrease in the "surplus."

THE NATIONAL WELL-BEING.

THE current number of the "Quarterly Review" contains two articles upon subjects which differ widely in their character, but both of which have a very important bearing upon social and industrial progress. The title of one is "Tariffs and National Well-Being;" of the other, "Profit-Sharing and Co-partnership." One deals with the panacea for real or imaginary industrial evils proposed by Mr. Chamberlain; the other, with the less obtrusive but eminently useful "missionary" work of such men as Sir George Livesey and M. Godin. Tariff reform is a means for artificially stimulating industry which its advocates believe will result in benefit to the working man, while certain to bring grist to the mill of the manufacturer or producer. Profit-sharing and co-partnership, on the other hand, are known to have resulted in benefit to the working man, and are believed to be also to the advantage of the employer. One remedy is, so far as the employed are concerned, speculative; the other absolute. At the same time, it is hardly a question of one system or the other; for a profit-sharer may be a Protectionist, and a Protectionist a profit-sharer. But while there can be no two opinions about the solid gain to the worker of profit-sharing and co-partnership, there are grave doubts in the minds of many as to what the effect of a "scientific" tariff is likely to be, more especially since its advocates have made definite assertions which facts do not support. It was said, for example, that in the course of two or three years ten million tons of American iron would be dumped into this country. The fulfilment of this prediction has not yet commenced; while the Steel Trust of the United States has experienced a disastrous slump, and the iron and steel industries of this country show distinct signs of revival.

The dead and dying industries upon which tariff reformers relied have, indeed, shown a vitality extremely inconvenient for their arguments. But it is not from this to be contended that the trade of the country does not stand in need of improvement. On the contrary, all political parties practically agree that (as recently said Lord Goschen) "it requires all the energies which the country can possibly put into it in order to keep that splendid trade which we still enjoy." The question is: In what directions ought these energies to be employed? Ought we to endeavour, by legislation, to force the current of trade to flow more freely to and from this country, or ought we not rather to promote economical and social reforms with the object of better equipping ourselves for competition with other countries? It is generally admitted that the employer needs education; and if that be so, he is not likely to learn his lesson the sooner if sheltered behind protective duties or given preferential entrance into British Colonies. The coal-mining industry may be referred to as an example of what is meant. Everyone must admit the vast importance of cheap coal to almost every other industry of this country, to say nothing of the benefit derived from maintenance of our export trade in it. The report of the Royal Commission on Coal Supplies recently issued, and referred to at some length in the last number of the "JOURNAL," makes it clear that, though there is available coal in abundance, the cost of getting it is likely to increase to such an extent as before very long to diminish the supply. Under these circumstances, greater economy of methods is clearly desirable, so far as this may be practicable; and the Commissioners found that in one direction—namely, in the employment of coal-cutting machines—much has been done during the last few years, the number of such machines in use having increased from 345 in 1901 to 643 in 1903. According, however, to Professor Chapman, in American coal mines in 1900 there were 3907 coal-cutting machines at work, or from six to seven for every one at work in British coal mines three years later. He reports, moreover, that the result of American methods is that the average pit's mouth price of American coal is 5s. 3¾d., against 10s. 9¾d. in the United Kingdom, though wages are higher in America. This comparison may, however, be somewhat misleading inasmuch as it evidently relates to a period of exceptionally high prices in this country. But, from the report already referred to, it is seen that the lowest average price here during the last ten years was 5s. 10·26d.; while the average price in 1903 was 7s. 7·93d. For 1904 it was probably lower, but still leaving a wide margin as compared with the average pit's mouth price of American coal above quoted.

This is but one of many similar instances from which it is inferred that "England has to recover the lead in respect of scientific research, technical instruction, labour-saving machinery, and workshop organization; and the working classes must put both their backs and their brains into their work. It is admitted that in capacity they have no superiors." How has the attitude of the working classes, so far, corresponded with what is thus desired of them? Only indifferently, it must be confessed. "The general spirit of Trade Unionism is to limit output rather than to stimulate it; and the desire of Trade Unionists is to restrict the supply of skilled labour rather than to increase it." A leading Trade Unionist is quoted by Sir Alfred Mosely as saying: "Just as it is the object of the master to get as much work as he can for as little wages as possible, so it is the object of the workman to get as much wages for as little work as possible." It is hardly to be wondered at that the United States are outstripping England in the industrial race, seeing that the working men in America are sufficiently educated to see that they profit by the productiveness of their labour, and are not possessed by the idea that it is to their own interest to do as little as they can in return for their wages. What the workman in this country does not see is that the more he produces the more he gets. His self-interest is not awakened; and he seems to gain by spinning out a given piece of work over the greatest possible number of hours.

Thus the workman has his lesson to learn as well as the employer; and he cannot realize too soon that increased productiveness means increased prosperity and employment. To make good things cheap is to increase trade; to keep them dear discourages it. The latter is, however, the tendency of the present organization of industry, which does not incite the average workman to do his best; and he is frequently taught to believe that he is actually benefited by doing less than his best. It is inevitable that this state of things should result in very serious loss to the nation. Imagine, in the words of Lord Grey, the difference between the output of ten millions of workers who believed that they are fulfilling their duty to their fellow-workmen by restricting their output, and that of the same number who believe it to be to the interest of all concerned that their work should be as efficient as possible. The difference has recently been estimated by a Trade Union official to be at least 30 per cent. But in addition to this loss to the national productive power, there is also the loss from deterioration of character which comes of slackness and want of industry, with its attendant thriftlessness and extravagance. There is also the huge national loss caused by strikes, one indirect effect of which is stated to be to add permanently to the great army of tramps and casuals. These are some of the results of industry being organized on a basis of war between capital and labour rather than on a basis of peace.

The problem which co-operators have attempted to solve is how to give the worker an obvious interest in the productiveness of his work, and to turn him from a hireling into a partner. The joint-stock principle, with limited liability, has enabled every one who can save a few pounds to enter as a shareholder upon industrial enterprise; and this system, with all its drawbacks, has caused an enormous increase in the wealth of the world by the massing of petty sums which separately could seldom have been employed productively, and by the conversion of them into capital which can be used collectively for the creation of wealth. The effect of this upon production has been enormous; while the middle class—the investing class—enjoy a standard of comfort which at no very remote period would have seemed impossible. Will it be possible, asks the "Saturday Review," for the twentieth century to do for the wage-earning man what the nineteenth century did for the middle classes—namely, encourage him to save by putting fairly safe and fairly remunerative industrial investment within his reach? Will it be possible, without abandoning the immense economic advantages of production on a large scale, to make the workmen something more than "hands"—mere parts of the machinery in the big concern—to convert them into partners by giving them a direct pecuniary interest in the productiveness of their labour, and at the same time a reasonably sound investment for their savings?

Practical answers to these questions are being supplied by two examples. The first is the South Metropolitan Gas Company's co-partnership scheme, since followed by the Commercial and South Suburban and other companies, with which all our readers are familiar, and with regard to which it is therefore only necessary here to quote Sir George Livesey's description of it to the Labour Commission: "It gave," said Sir George, "in the place of hostility

and antagonism, peace and goodwill; in the place of doubt and mistrust, confidence; and in the place of sullen, discontented workmen, a body of cheerful, willing, capable workers, with whom it was a pleasure to be associated." The employees are now partners in the undertaking to the extent of owning nearly £250,000 of the Company's stock, and are represented on the Board by three Workmen Directors. The second example is furnished by the French co-partnership scheme adopted at Guise, which is less widely known in this country. Its fundamental aim is the same—namely, to make the workman a capitalist, and to engage his intelligence and interest in making his labour as productive as possible. But in method it is widely different from the South Metropolitan scheme. M. Godin, the founder, who began work at eleven years of age at his father's forge, was very early impressed by the hard labour which kept him in the workshop from five in the morning till eight at night. "I saw," he says, "in all its nakedness, the destitution of the workman and his needs; and it was in the dejection this brought upon me that, in spite of my small confidence of my own ability, I said to myself, 'If ever I lift myself above the condition of the workman, I will seek means to render his life happier, and to lift labour from its degradation.'" How well he afterwards succeeded in his lofty ideal may be very briefly told to-day. His plan included not only the participation by the worknen in the profits of the business, but provision for all their wants and wishes from the cradle to the grave. He erected large and commodious buildings, such as would be called in this country workmen's dwellings, known at Guise as *famillistères*. These are let at about 8s. a month for two rooms, have ample air space within, and are surrounded outside by a charming park, kitchen and flower gardens, and recreation fields. Excellent schools, a theatre, a library, baths and washhouses, and shops of all kinds, are also provided. The co-partnership idea is developed by deducting as first charges upon the gross profits certain sums for depreciation of buildings; various mutual insurance funds; expenses of education; and interest on workmen's shares. What remains after satisfaction of these claims is divided into four parts—one being allotted to the brain workers, and the other three divided between labour and capital. Capital is given "wages" at the rate of 5 per cent. The rules of the society were framed to guard against the possibility of the management of the business falling into the hands of a committee of workmen who had never had any training in commerce. The workmen were divided into four classes, whose powers range from zero to first-class members; the latter alone being entitled to elect members of the Committee of Management. M. Godin died in 1888; but his work "remains a living proof of what can be done to raise the status of the working classes, and to foster a wholesome relationship between capital and labour."

It is said that "one main difficulty in putting into general operation such schemes as those which have been so successful at the South Metropolitan Gas-Works and elsewhere, and also at Guise, is that they require, especially in their initial stages, the control and guidance of exceptional men." Schemes less perfectly devised may have a greater chance of general adoption if they require for their successful development no extraordinary qualities on the part of either employers or employed. Such a plan of overcoming antagonism of interest between labour and capital, and of rewarding labour in proportion to its degree of efficiency, has been found in what is known as the "premium" system of paying wages. This system was explained in the "JOURNAL" for Oct. 4 last year, when regret was expressed that the New Trade Unionism, represented by the Federation of Engineering and Shipbuilding Trade Unions, should have expressed themselves adversely to it. The men, however, who have had experience of it like a system which has increased their wages from 10 to 50 per cent. In one engineering firm in which the premium system has been adopted, the employers organized a monthly meeting of foremen and heads of departments to discuss shop problems. This meeting was nicknamed the Friction Club, in the belief that it could only lead to wrangling and dissension. In practice, however, it has proved a valuable institution.

The advantages of industrial co-operation are exemplified by a description of its development in connection with agriculture in Ireland. While politicians have been wrangling over the causes of its ruin, social reformers have already effected a notable improvement in Irish agriculture, by arousing in the Irish peasant a sense of his own responsibility for his condition, and stimulating him to strive for economic independence by economic, not political, means. Sir Horace Plunkett and a band of fellow-workers started in 1889 to endeavour to induce dairy farmers in the south and west of Ireland to combine for the production of butter in large quantities and of uniform good quality. How well they have succeeded may be judged of by the fact that, commencing with one creamery having fifty associated members, at the end of fourteen years' work 360 had been established with a membership of more than 80,000. The sales of butter from these co-operative creameries in 1903 amounted in value to £1,350,000. We must eny ourselves the pleasure of describing in further detail a movement which has already achieved much, and promises to do a great deal more, for the prosperity of Ireland. Enough has been said on this and other cognate subjects to show that the articles to which reference has been made are well deserving of the careful study of all who are interested in social and industrial progress; and we are much mistaken if the impartial reader will not find in them the true solution of some of the most pressing of the economic problems of the times.

THE PROGRESS OF THE COMPETITOR.

READERS of certain of the electrical papers have, as usual, been presented with a mass of statistics at the beginning of the year; and in quantity they come well within the "supply-in-bulk" category of electrical performance. The most formidable of these editorial gifts are three sheets of tables—printed on both sides of the paper—issued with separate numbers of the "Electrician;" and we must congratulate the staff of our contemporary upon their industry, upon the pains they have apparently bestowed on the work to ensure accuracy, and upon the vast amount of useful material they have assembled. The degree of interest and serviceableness of such a collection of matter as this, however, has a direct relation to (in addition to truthfulness) the facility of reference; and in these tables the "Electrician" has ensured, by the system of arrangement, that those who desire to extract from them any considerable information, or who have a wish to profitably study them, shall encounter the maximum of difficulty and chances of going astray. For instance, the largest table measures, roughly speaking, 3 ft. by 4 ft. 6 in.; and figures cover both sides of this spacious sheet. The result is that the student of the end columns has to be constantly turning his eyes back over nearly 3 feet of statistics before he can find the town to which the figures in the columns refer. This is inconvenient; and every column one progressses accentuates the danger of error. It would, if we may be permitted one further piece of criticism, be of immense value if our contemporary would prepare something in the nature of an analysis of these tables, with groupings, totals, and so forth. The worth of their already valuable work would then be very greatly enhanced.

However. notwithstanding these drawbacks, all who desire to learn something about the progress of things electrical, will pick up much that is informing in these statistics, which are in the nature of working and not financial figures, and thus their imposing bulk may not convey anything as to success or otherwise of the various undertakings. We are among those who are interested in them, and so are our readers; and a few impressions will be of interest. In the first table under nearly four dozen headings we get particulars of 260 electricity supply undertakings without tramway loads. In the technical details, we have no special concern; naturally our interest centres in the figures which have any bearing on the commercial side of the business, as it is on that side the gas industry comes into touch. One of the first things that strikes one who looks at the tables from this point of view is the convenience, in the making of a healthy looking statistical showing, of the 8-candle power lamp unit. One sees under the head of "Private Lighting, Reduced to the Equivalent of 8-c.p. Lamps," the lamps set out in their thousands; but when the column telling of the number of electricity consumers is examined, the glory of those thousands of 8-candle power lamps fades. Supposing, in talking of gas connections, we were to adopt, as a suitable unit, 8-candle power, and convert all our incandescent gas-burners to it (leaving out of consideration the out-of-date flat-flames), we should have rather a remarkable showing, seeing that each well-conditioned common "C" burner would alone represent six to eight 8-candle power lamps—actual, not nominal only. Why, the man who merely boasted 20 incandescent "C" burners in his house would, by "reducing" them to the equivalent of 8-candle power lamps, assert his possession, after the manner of our electrical friends, of (say) 140 lamps. Under these circumstances, we are not likely to set about the insuperable task of trying to compile, on such lines, similar statistics. Looking to the column showing the number of consumers, it is remarkable what a considerable proportion of the undertakings have still under 250 consumers; several have 150 and below; and there are not a few that have even less than 100 consumers—these being the fledglings. Of course, there are also a number with more than 250 consumers. But as they ascend, the undertakings with higher numbers thin off; and, if we except the London undertakings, there are only 27 which, in respect of the number of consumers, run into four figures—that is to say, there are about 200 of the 260 undertakings with from 16 (Church Stretton) up to 960 consumers (Eastbourne and Newcastle). It is naturally the great cities, with shops and business and manufacturing establishments thickly concentrated, where the greatest number of connections per mile of cable are found, where the greatest number of lamps per consumer obtain, and where the greatest consumption of current per lamp is the rule. Perhaps all these points will not apply to every large town; but some of the figures taken indiscriminately from the tables are convincing that generally speaking these things are so. Therefore, as one goes down the scale in the magnitude of the town, or its suitability for electric lighting business, one finds, very frequently, that not only does the number of consumers (as would be expected) decrease), but that those consumers are not on the average such "fat" ones for the electrical suppliers. This is not peculiar to the electrical business; but it is believed that it is more so than in the case of the gas business, in view of the higher cost of illumination by the electrical system. These, however, are facts that are conveniently kept concealed by some engineers in advising the smaller towns as to their prospects before they launch out into electricity supply; and they show how misleading are, how ignominious the tactics which have to be supported by, comparisons of such towns with those of a much more fertile order

which have preceded them in electrical supply. We have seen the "Electrician" protest against this kind of thing; and the tables now before us show how, in cases, successful have been the tactics, how unsuccessful the undertakings. But will it stop? We have our contemporary in a comment on the tables, saying; "It is evident that, with but few exceptions, none but the very smallest of towns will be without electric light in the future; and consulting engineers who have specialized in the work of designing electricity works have now to be seeking fresh fields for their talents." This does not look promising for an affirmative reply to the above answer; and therefore it may be expected that the string of towns with unproductive electricity undertakings will be extended as time goes on—that is to say, if the Northumberland clauses are not applied. Without them, in the small towns, the undertakings are sure to be productive—of loss.

We look at another column, to see what has been the success in connection with the use of electricity for motive power, at prices substantially reduced from those for lighting, to create a day load, particularly in view of the incapacity of electricity to enter into the cooking and heating field—excepting the former by barbarous methods, and the latter by methods that make one shiver to look at them in the cold weather. However, in that column, it is, of course, seen that the centres of industry have secured the largest adoption for power purposes of electricity measured in terms of horse power, which is no criterion as to the number of users who prefer electricity as motive power to other systems. Spread over the 260 cities and towns, we have a total horse power of only 78,838, which averages (for the 260 cities and towns) 303-horse power. This is not a remarkable showing, despite the greatly reduced price. But it is further observed that only 19 of the 260 towns have managed to mount up to a horse power represented by four figures. So that really there is not much to boast about in the fact that 241 towns have users of electricity in this manner who count their total horse power in numbers ranging from less than 1000 down to the lowest of double figures.

The columns referring to the prices charged have a decided attraction for us; and it is observed that it is quite a common thing now for those responsible for the management of electrical undertakings to give those with whom they do business for lighting purposes the choice of the maximum demand system and the flat-rate. The variations of prices are glorious in their multiplicity, and, no doubt, complexity for the consumers. We have no desire to reproduce a large number of figures, but, by way of example, in different towns we find, under the former system of charging, prices ranging from 9d. per unit (for the first 1½ hours) to 1½d., 8d. for the first hour to 5d. and 2½d. per unit, 7d. to 2½d., 6d. to 5d., 6d. to 1¾d., 5¾d. to 4d., 5½d. to 2d., 5d. (1·1 hour) to 1½d., 5d. to 3d., 5d. (1¼ hours) to 2d., 4½d. to 1¾d. One or two mention 8d. to 2d., with free wiring. Where there are flat-rate alternatives, or where the flat-rate only prevails, the prices are somewhere in the neighbourhood of 5d., 4½d., and 4d. per unit. Another form of charge is 6d. on the flat-rate, or 10s. per 8-candle power lamp "demanded," *plus* 1½d. a unit; a further one is 5d. flat-rate, or 9s. 3d. per 8-candle power lamp per annum. In one instance, it is noticed that 4d. is specified as a special charge for mills; and churches here and there are allowed the privilege of their electric lighting at specially mentioned rates—examples being 3d. and 5d. The sliding scale of price on quantities is occasionally adopted—for instance, 5½d. for the first 1000 units, 4½d. for the next 3000 units, and in excess of 4000 units 3½d. The practice of allowing discounts for prompt payment is largely followed; but very little is gathered as to prepayment supply. For power supply, there is a great divergence of opinion revealed by the statistics as to what is a fair opening figure. The long list shows that fancy or necessity dictates anything between 7d. and 2d. per unit, with bottom figures of (say) 1d. even down, in isolated cases, to ¾d. and ¾d. A good representative charge is 4½d. to 1½d. for power purposes. At Preston, we have electricity for this purpose offered at 7d. to 3d., with 50 per cent. discount; there the price of gas is 2s. per 1000 cubic feet, less 15 per cent.! So that the heaviness of the discount there for electricity supply is fully explained. Another method of charging for power is exemplified by 3d. per unit up to 5000 units per annum, 2½d. per unit to 10,000 units, and 2d. above. Another concern charges 3d. per unit for the first 3500 units and 2d. after; while the idea has blossomed into practice of 1½d. per unit during the day, and 3d. per unit from dusk to midnight. For power purposes very few go in for the flat-rate; and those who do show prices varying between 5d. and 1½d. per unit. A concern with an eye to its protection supply at 3d. per unit, with a minimum of 10s. per horse power per quarter! There are cases of sliding-scales on these lines: Up to 10,000 units, 2d. per unit; 20,000 units, 1⅞d.; 30,000 units, 1½d.; and 40,000 units, 1¼d. There is one undertaking quoting electricity for heating at 2d. per unit, and another at 1d. But there appears to be a shyness over information regarding this business.

Turning from this extensive table for the moment, and consulting one published subsequently, which gives particulars of 114 electricity works supplying lighting, power, and tramways, we find that the linking of the big business of the tram supply with that for lighting and power purposes has no effect, as one would suppose it would have, in relieving the charges on the ordinary consumers; the prices running much on the same lines as those to which we have been referring in connection with the 260 undertakings which have no tramway load. In other words, although tramway supply represents the heaviest load on the undertaking, and should in consequence bear the largest proportion of the costs, in view of the work demanded, the figures charged for lighting and power compared with those in the cases of undertakings without a tramway supply, conclusively prove that the ordinary consumers gain nothing by being customers of the undertakings with tramway loads, through the exceedingly low prices charged for this purpose. Does not this indicate that the ordinary consumers bear an undue proportion of the costs? This forsooth looks a doubtful policy in a business open to the competition of the incandescent gas-light. The tramway supply is definite; it has no competitor. Not so electricity for ordinary purposes; and more especially in those towns with tramways one generally finds the largest gas undertakings, who are better circumstanced than the smaller undertakings for supplying at a cheap rate. Nor do the prices for street lighting show that any advantage is gained. There is something wrong when electricity stations with such tremendous outputs as those with a tramway load cannot supply the ordinary consumers with their current at a cheaper rate than those stations with smaller outputs.

Still on the question of price, the tables do not show that those undertakings who purchase their supplies in bulk are able to distribute it to the consumers at low prices, although there are only the capital and ordinary charges of distribution and for management to be provided. The towns taking electricity supply in bulk number fifteen; and, under the maximum demand system, the initial prices to the consumers range from 8d. to 5d. per unit, and those at the other end between 4d. and 1d. The prices on the flat-rate are 7d., 6d., 5d., and 4½d. For power supply, the initial prices vary between 7d. and 2½d. down to 2d. and 1¼d. The number of these bulk stations is rapidly increasing; and in the view of the "Electrician"—bearing in mind the recent action of the Local Government Board in the cases of Stourbridge and Wood Green—there is every probability that the list will soon be much larger. Touching upon this too, it is seen that the number of generating stations in progress is less than last year; and the comment is made that "this will be more than compensated before the end of the year by the number of undertakings in which the supply is to be bought in bulk and then retailed."

Further information collected from the tables is that there are thirteen places where electricity works are in progress; there are 84 projected stations; 19 projected for both lighting and tramway purposes; a large number of Provisional Orders have been undeveloped; 61 Provisional Orders have been transferred; and there are seven non-statutory undertakings. It is also ascertained that there are eight electric power undertakings in operation, three in progress, and sixteen others have been sanctioned by Parliament between 1901 and last session.

Under the head of "generating sets" in the tables, it is observed that, while the use of gas as motive power is not considerably favoured by electricity suppliers, there are sufficient stations now running with gas-engines to get an abundance of varied experience, in order to decide whether or not gas shall have part in the production of electricity. There are not far short of thirty stations with gas-driven sets—the Crossley type of engine predominating, with representatives of the "Stockport," "Premier," Campbell, Westinghouse, Tangye, Fielding and Platt, and Newton engines. Of course, most of them are driven by producer gas, made on various well-known systems. It looks hopeful, however, when we see that works are contemplating to-day introducing gas for the same purpose. It is to Malton that eyes will be turned to bring us further experience as to what town's gas can do at an electricity station.

To sum up the extent of the present electrical competitive force as represented by undertakings, we cannot do better than "lift" from the "Electrical Times" (with all suitable apologies) the following table:—

	Local Authorities.		Companies.		Total.	
	Orders.	Undertakings.	Orders.	Undertakings.	Orders.	Undertakings.
Works in operation .	280 ..	244	218 ..	136	498 ..	380
Works in course of construction . . .	92 ..	90	42 ..	39	134 ..	129
Works not yet decided upon	106 ..	—	30 ..	—	136 ..	—
	478 ..	334	290 ..	175	768 ..	509

The Council of the British Association have issued a preliminary circular setting forth the arrangements so far made with regard to the meeting in South Africa, which will be opened in Cape Town on the 15th of August; the sectional meetings being held there and at Johannesburg. The President-Elect of the Chemical Section is Mr. George T. Beilby; the Engineering Section being under the presidency of Colonel Sir Colin Scott-Moncrieff, G.S.S.I., R.E.

Mr. W. A. Jones, one of the Directors of the Monte Video Water Company, whose will has lately been proved, left estate valued at £46,080. Among the directions contained in the will of Viscount Ridley, who died on the 28th of November last, leaving estate of the gross value of £535,615, of which the net personalty has been sworn at £281,975, is one to the effect that his Trustee is to sell at a nominal figure parcels of land, not exceeding two acres each, to provide sites for the erection of railway, water, gas, or electric lighting works, or any others designed for public or charitable uses.

NAPHTHALENE TREATMENT AT LEICESTER.

The figures showing the results during January of the treatment of the gas at Leicester for naphthalene are appended. It will be noticed that there was not a single naphthalene complaint received in the whole of the month, as against a total of 968 for January last year, or a daily average of 37. The course of treatment already described has been followed—namely, washing at one works, and spraying at the other. From the first of this month, however, Mr. Colson is treating only 50 per cent. of the gas at each works, instead of the whole of it. It will further be remarked in the second table that there was not any water gas made in the month, as against 13,166,000 cubic feet last year, or 9·74 per cent. of that produced at Aylestone Road.

NAPHTHALENE COMPLAINTS.

	This Year.	Last Year.		This Year.	Last Year.
Jan. 1	0	82	Jan. 18	0	41
,, 2	0	58	,, 19	0	47
,, 3	0	1	,, 20	0	32
,, 4	0	91	,, 21	0	11
,, 5	0	67	,, 22	0	23
,, 6	0	54	,, 23	0	27
,, 7	0	49	,, 24	0	0
,, 8	0	39	,, 25	0	10
,, 9	0	21	,, 26	0	13
,, 10	0	0	,, 27	0	16
,, 11	0	51	,, 28	0	17
,, 12	0	44	,, 29	0	20
,, 13	0	41	,, 30	0	12
,, 14	0	44	,, 31	0	0
,, 15	0	37		—	—
,, 16	0	19	Total	0	968
,, 17	0	1			

NAPHTHALENE TREATMENT.

1905. Week ending	Aylestone Road. Coal Gas Made. Cubic Feet.	Coal Gas Treated. Cubic Feet.	Coal Gas Untreated. Cubic Feet.	Percentage of Coal Gas Treated.	Water Gas Made. Cubic Feet.	Total Coal and Water Gas.	Percentage of Water Gas.	Belgrave Gate. Coal Gas Made. Cubic Feet.	Coal Gas Treated with Spray of Solvent.	Percentage of Coal Gas Treated.	Total Coal Gas Made at both Works.	Total Coal and Water Gas Made at both Works.	Total Gas Treated at both Works.	Percentage of Gas Treated at both Works.
Jan. 5	33,068,000	33,068,000	*nil*	100·00	*nil*	33,068,000	—	16,452,000	16,452,000	100·00	49,520,000	49,520,000	49,520,000	100·00
,, 12	32,231,000	32,231,000	*nil*	100·00	*nil*	32,231,000	—	16,067,000	16,067,000	100·00	48,298,000	48,298,000	48,298,000	100·00
,, 19	34,377,000	34,377,000	*nil*	100·00	*nil*	34,377,000	—	16,096,000	16,096,000	100·00	50,473,000	50,473,000	50,473,000	100·00
,, 26	36,698,000	36,698,000	*nil*	100·00	*nil*	36,698,000	—	15,953,000	15,953,000	100·00	52,651,000	52,651,000	52,651,000	100·00
Total	136,374,000	136,374,000	*nil*	100·00	*nil*	136,374,000	—	64,568,000	64,568,000	100·00	200,942,000	200,942,000	200,942,000	100·00
Corresponding period of last Year .	121,999,000	—	—	—	13,166,000	135,165,000	9·74	66,130,000	—	—	188,129,000	201,294,000	—	—

METROPOLITAN GAS COMPANIES AND THE PORT OF LONDON BILLS.

In view of the several Bills to come before Parliament next session relating to the Port of London, an Association has been formed to protect the interests of the waterside manufacturers. London has hitherto been a Free Port; but the measures above referred to involve the expenditure of a large amount of capital, and the consequent taxing of goods to pay the interest thereon and the working expenses. Last year, the manufacturers obtained a hearing against the various Bills in Parliament; and representation was granted them upon the public body or bodies which might be formed to deal with the river and its port. A few weeks ago, a deputation from the Committee of Manufacturers waited upon Sir George Livesey to urge him to accept the presidency of the Association; and although he was very reluctant to undertake additional duties, he felt that he could not possibly decline. He therefore consented to become the first President. The Association have a very good Committee, among whom are Mr. Alexander Siemens (Messrs. Siemens Bros. and Co., Limited), Mr. John Harvey (Messrs. Charles Price and Co.), Mr. D. Howard (Messrs. Howard and Sons, Limited), Mr. A. Brooks (Associated Portland Cement Manufacturers), Mr. E. Workman (Messrs. Doulton and Co., Limited), and Mr. T. Elborough (of the Lawes Chemical Manure Company). The number of waterside firms represented in June, 1903, was 119, with an invested capital of £72,000,000, occupying premises of the rateable value of £471,783, and importing 6,831,385 tons of raw material; and the estimated particulars of others brought the figures up to 339 firms, with an invested capital of £92,000,000, occupying premises of the rateable value of £571,783, and importing 7,831,385 tons of material. It will thus be seen that the interests concerned are very large. As this great bulk of material includes that used in gas-works, the London Gas Companies will be affected by whatever measures are sanctioned by Parliament; and we understand that the Directors of the Gaslight and Coke and South Metropolitan Companies have decided that the Companies shall be represented on the Association. The objects of the Association are, broadly, to promote the discussion of all questions affecting the interests of the members or of the other waterside manufacturers; to represent to the Legislature and other public bodies the views and interests of the manufacturers; and to promote, support, or oppose legislative and other measures affecting those interests. The Association will also afford the members facilities for mutual co-operation, and encourage the settlement by arbitration of any questions in which, whether as a body or as individuals, they are concerned.

One of the Bills to which the attention of the Association will be specially directed is that promoted by the Thames Conservancy to obtain further money and other powers. By clause 9 of the Bill, the Conservators are to be allowed, after Jan. 1, 1906, to demand, in respect of all goods and minerals brought into, or sent out of, the Port of London, dues or rates not exceeding those specified in the schedule to the Bill; and their Act of 1894 is to be amended so as to increase the duties specified in section 155 from ½d. and ¾d. to 1d. and 1½d. per ton respectively. The Conservators are also to be empowered to demand for the use of any public quays, jetties, or other accommodation provided by, or belonging to, them, and for the use of cranes or other appliances thereon, such reasonable rates and charges as they shall from time to time appoint, with the approval of the Board of Trade.

In the schedule to the Bill, the maximum rates per ton which may be charged on the various articles named are as follows: Acid (sulphuric), 2d.; ammonia (carbonate, nitrate, muriate, and other salts), 6d.; ammonia (sulphate), 3d.; brass gas tubes and fittings, 4½d.; brimstone or sulphur, 1½d.; coal and coke, 3d.; coal dust and cinders, 1½d.; gas oil in bulk, to be used for gas making only, 3d.; gas-pipes, 1½d.; gas-tubes, 2½d.; gas-retorts, 3d.; naphtha (spirits), 6d.; naphthalene, 2d.; petroleum, 2d.; nitrate of soda, 3d.; and tar (coal), 1½d.

WORKSHOP PRACTICE IN AMERICA AND IN ENGLAND.

At the last Meeting of the Institution of Mechanical Engineers, one of the members—Mr. A. J. Gimson, of Leicester—read an interesting paper in which he recounted his impressions of American workshops, obtained during a recent visit. The works visited ranged from factories at least two generations old, where generally a considerable variety of work was undertaken, to modern workshops of but a few years' growth, where only a special class of machine was manufactured. He said the very best of these workshops, with possibly one exception, could be matched in equipment and in general methods of carrying out work by single works in this country; while some of them were in no way in advance of ordinary practice here. In general, however, the arrangement of an engineer's workshop in America struck him as being superior to that in similar works in England; while in some the organization was in every detail admirably thought out and administered. A feature of the engineering industry that impressed Mr. Gimson was the close intercommunication of technical institutes and manufacturing workshops, of professors and manufacturers, and the presence, in minor positions of authority, of young men who had passed through a complete course of technical instruction. Though he did not remember having seen any workmen exerting themselves more than is usual in shops in England, he is convinced that more work is obtained from them by the close study of economies by the staff in the drawing and allied offices. An American employer will see that his workmen have no reason to use their time for any purpose in which they are not skilled. His foremen will not do clerk's work; and his machine men will not be grinders of tools or designers and

constructors of methods for holding and machining the work. A machine minder's business is to keep his machine moving and his tools cutting every minute of the day that is possible; and the foreman's to see that the work is quickly and correctly done. The author said he had seen works where every separate job for every machine was ordered and arranged solely from the office, where every detail in the process of its machining was settled, and the number of minutes each process must occupy displayed before the article reached the workman's hands. In such a factory a liberal bonus is paid for a saving in time; and rigorous methods are in force against those who fail to carry out the work in the minutes or hours stipulated. The able man is allowed full play for his ability, and is rewarded by a very great increase in money earned over his slower or less industrious neighbour. Persistent energy and patience have achieved remarkable results in the organization of cheap production in some of these workshops. This, the author thinks, is the chief difference, stated in general terms, between English and American workshop practice. Here they are somewhat wasteful of the workmen's time; in America they are careful of it to a remarkable extent. It follows that if American engineers are to compete successfully against English engineers, it will be, Mr. Gimson thinks, because the organizers of their businesses know their work, and carry it out, better than do the organizers of businesses here. Their workmen are in no way superior, but their skill and ability are used to better advantage.

THE LADY LECTURER AND TEACHER.

Correspondence on the Article published in the "Journal" for Jan. 24.

Mrs. Emilie K. Deane, L.C.A.

Many thanks for sending me your very interesting article on "The Lady Lecturer and Teacher." I quite endorse what you say; and I think, if the thoroughly practical suggestions made by you would be acted upon by the gas companies, much benefit would result both to the consumers and to them. At present, sufficient use is not made of gas-stoves, because people do not thoroughly understand the management of them.

It is a capital suggestion of yours to have a lady expert attached to each gas company, and, I would imagine, quite feasible, her duties to consist of:

1.—Lectures on cookery on special stated days in the showroom or some room attached to the gas office. These lectures to be short, practical, and bright.

2.—Paying periodical visits of inspection to the houses of gas consumers who have stoves on hire from the gas company.

3.—Giving lessons, if desired, at ladies' own houses, to explain any difficulties they find in managing the stoves.

During my lecturing tour for Messrs. Willey and Co., of Exeter, last year, I did some such work for them at Dartmouth, which proved very successful and was much appreciated by the consumers. I never met with any rudeness, but with the greatest kindness and consideration from everyone. Of course, one must exercise tact; but then that is necessary in every work that one undertakes if one wishes to be successful.

From my experience of cookery teaching for technical councils throughout the kingdom, I am doubtful if it would be possible to give lectures in the schools, as this would interfere with the work of the cookery instructress appointed by the different councils; but I think some arrangement could be made that school children might attend the lectures given in the town under the auspices of the gas company, and competitions might be held among those who have attended, and so make the instruction given more useful and impressive.

I do not think cookery lectures at all "played out;" but I consider that the lecturer should be more carefully chosen than sometimes is the case. Not long ago I went to a cookery lecture (on the principle of the 'bus driver's holiday), and it was nothing but an inarticulate jumble. I am sure no one could have derived either profit or pleasure from it.

22, *Warwick Road, Earl's Court, S.W.*

Mrs. E. A. Springthorpe.

Your article on "The Services of the Lady Lecturer and Teacher" appears to me to be published at an opportune moment, as, although in some towns gas cookery lectures still attract large audiences, the majority of the general public take no interest in cookery either with the gas-stove or by any other method, a fact which is constantly deplored by the Committee of the Cookery and Food Association (a high authority on such matters), who spare neither time nor money in giving free cookery lectures to the poor in London, and offering prizes for competition at their annual exhibition. Therefore it will be a great advantage to all concerned, if, as the outcome of your article, further developments ensue, which will prove attractive.

We rarely get artisans' wives at the lectures; no matter how we try and arrange the programme to suit them; they say they can cook anything that they can afford to buy. This idea shows they do not realize the importance of learning more varied methods of cooking, by which they could get better value for their money, and greater variety.

In some of the large towns and cities in the North, there is still great scope for the gas-cooker to be brought before the public, although there are a large number in use. The women are generally clean, industrious, and good cooks, and would appreciate the convenience of the gas-stove if they would only give it a trial; for I have noticed a harassed look on their faces, probably partly due to their anxiety concerning their household duties.

Regarding children's competitions, these are usually a very great success; and no doubt they have a far-reaching influence. They always attract the parents, and educate the children in the elementary stages of gas cooking. I have been really surprised at the way girls of twelve years of age have grasped the whole thing, both in the preparation and cooking of cakes, puddings, &c., with the gas-stove, who have never really attempted anything of the kind before. Many of them are very enthusiastic about it; and most probably will not be content without a gas-stove when they have homes of their own.

It is, however, very difficult to get grown-up people to enter for a competition; they are so much more self-conscious than children, and shrink from appearing on a public platform. The outlay for utensils and prizes is also considerable; still, where joint exhibitions are held, the end might justify the means.

Good organization is essential, as the audience soon get wearied if matters do not run smoothly and smartly.

In a recent number of "The Cookery and Food Magazine," I noticed a criticism on the competitions at the Earl's Court Exhibition, to the effect that quality was sacrificed to time. Perhaps in the early stages this was the case; but towards the close, the competitors found that they gained nothing by rushing, and that in the end method wins.

The question of lady visitors and inspectors is rather a difficult one. In any case, it would require great tact. Certainly the servants need instruction in gas-stove cooking and cleaning. Would it be possible for the gas companies to arrange classes for general servants and cooks? Ladies might be glad to send their servants for such a purpose.

I trust that good results may follow the movement you have initiated.

33, *Heathland Road, Stamford Hill, N.*

First-Class Diplomée.

In reference to the article on "The Services of the Lady Lecturer and Teacher" in the "Journal" of the 24th ult., a number of years' experience in gas cookery lecturing has led me to form the view that the falling off in popular favour of the ordinary gas exhibition might, in many instances, be much less pronounced if a greater degree of interest were shown by the gas departments in such means of educating the public regarding gas cooking.

At many exhibitions not a single gas official (beyond the fitter) has put in an appearance; there being a seeming tendency on their part not to quite realize the good use that may be made of these exhibitions. When the public attending the lectures are told that orders will be taken on behalf of the gas company, but do not see any representative of the company, they are apt to look upon the whole arrangement as mere private enterprise on the part of the stove makers. On the other hand, where the gas office people have co-operated energetically in the working of the exhibition, the results to everyone have been satisfactory.

In many towns, the gas department erect a stand showing all kinds of incandescent fittings, globes, &c.; and if this were done in every case, I feel confident the public would attend in larger numbers.

Although gas cooking is not the novelty it was some years ago, there still seems plenty of need for education on the part of the public with regard to it. It is surprising to find that so many excellent housewives are ignorant as to the principles of gas cooking—many, for instance, not having the slightest idea of what is meant by the burner lighting-back, and condemning gas-cookers altogether when this trifling mishap occurs, instead of applying the very simple remedy.

My experience has convinced me that, if the consumers were properly instructed as to the uses of gas for cooking, and kept as well in hand by the gas officials generally as, I am glad to say, they are in a number of cases, there would be fewer cookers returned, and cooking by gas would become even more popular.

Manchester District Institution of Gas Engineers.—We learn from the Hon. Secretary of the Institution (Mr. H. Kendrick, of Stretford) that the annual meeting will be held in Manchester on the 25th inst., and that the programme will include an address by the new President, Mr. S. Meunier, of Stockport, and a paper by Mr. R. Watson, of Doncaster, as well as a report on the proposed gas exhibition and other matters. Mr. Kendrick informs us that, after full discussion, the Committee decided to recommend to the members that it is desirable to hold an exhibition in Manchester in the near future, and that the question be again taken into consideration next autumn. They are of opinion that the time named is too soon after the Earl's Court Exhibition; and they passed a resolution thanking the President and Secretary for their efforts to obtain the opinion of the members and manufacturers on the subject.

THE DEVELOPMENT OF PURIFYING PLANT.

A Few Notes on "Jäger" Grids.

By JOHN C. BELTON, Engineer and Manager, Chester Gas-Works.

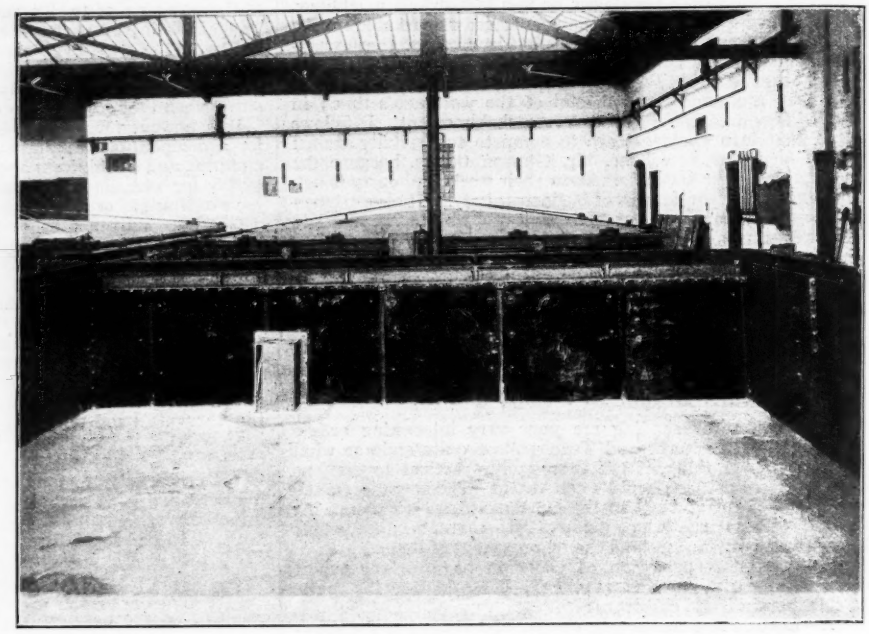
The problem of securing an increase of purifying efficiency, without undesirable capital expenditure, has troubled many an anxious engineer when the stress of a heavy season has made all too apparent the inability of his purifiers to cope with the ever-growing demands upon their capacity.

The advent of the Jäger system of filling purifiers marks the dawn of a brighter day for those who are thus worried; for not only does it render possible the obtaining of greatly increased duty from existing plant, but promises also a not inconsiderable reduction of the ordinary labour charges on purification account. And, moreover, it offers to do this for a moiety of the cost which would have to be incurred if relief were sought by adopting the alternative of putting down purifiers of greater area than those which have become too small for growing needs.

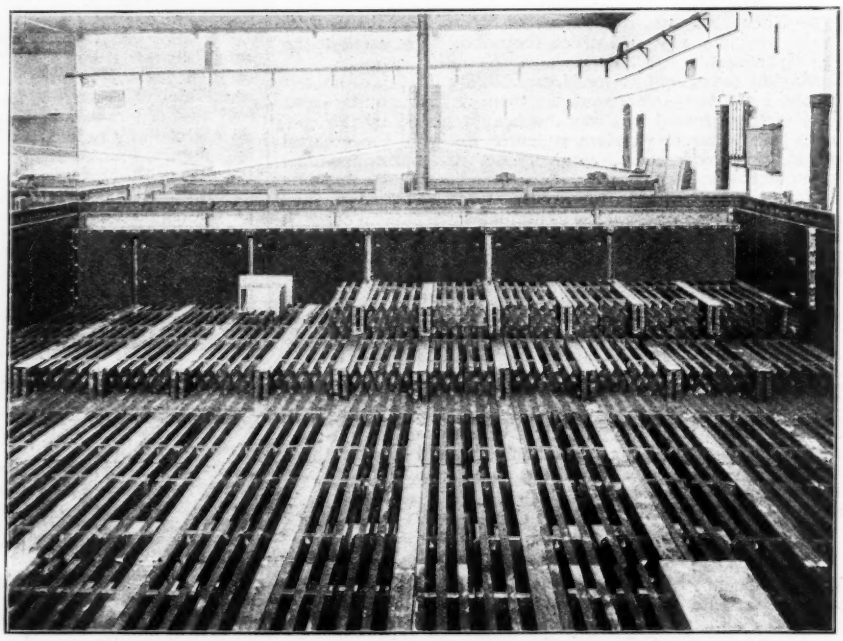
A brief account of six months' experience with the "Jäger" grids may be of interest to readers of the "JOURNAL" who are faced by the necessity to do something in the way of increasing their purifying plant; and it is with a view to assist such, and not for controversial ends, that I venture to publish the results obtained at the Chester Gas-Works.

The oxide purifiers here are four in number, each 24 ft. by 22 ft. by 5 ft. Taking Newbigging's well-known rule as the standard of area required, it will be seen that these are equal to a daily make of 870,000 cubic feet, or 36,250 cubic feet per hour; and the natural result of increasing their duty to 45,000 cubic feet per hour was such an increase of back-pressure as to necessitate a considerable decrease in the thickness of the layers of material, in order to avoid frequent blowing of the lutes, with the further sequence of more rapid fouling, more frequent changing, and, of course, heavier labour charges. It was in the hope of obtaining relief from these conditions, and obviating the necessity for purifiers of larger capacity, that it was decided to give the Jäger system a trial. The results have fully justified the adoption of that course.

One purifier only, No. 3 in the set, was dealt with in the first instance. The necessary alteration of the interior fittings having been completed, the box was filled on June 14, and remained in action until Sept. 9. It would, in the ordinary course of things, have remained until Sept. 25, as the purifier next but one preceding it did not foul until that date. But for reasons of convenience, it was put out of series on the earlier date. The day after the purifier was put in action, No. 4 was changed for the purpose of fixing a new curb. Ten days later No. 1 was changed for a similar purpose. No. 2 thus became the inlet or foul purifier only eleven days after No. 3 was put on. The average run of the ordinary purifiers in summer is about 29,000,000 cubic feet. At the time No. 1 was prematurely put out of action, it had passed only 17,500,000 cubic feet, and had still a life of about 11,000,000 cubic feet to its credit. The fouling of No. 3 was thus accelerated by that amount; and this has to be taken into account in calculating the duty obtained from it on the first run with Jäger grids; and the total duty obtained is thus arrived at: Gas passed during run June 14 to Sept. 9, 37,092,000 cubic feet; Sept. 9 to 25 (when No. 1 fouled), 8,124,000 cubic feet; allowance for acceleration by premature changing of No. 4 and No. 1, as stated above, 10,679,000 cubic feet—total, 55,895,000 cubic feet. This is an increase of nearly 27,000,000 cubic feet, or 92 per cent., over the average summer duty obtained under the ordinary system. The material used was Irish bog ore, containing 21 per cent. of sulphur (wet basis), and the sulphur taken up on the run I have been referring to was 11·9 per cent. (wet basis).

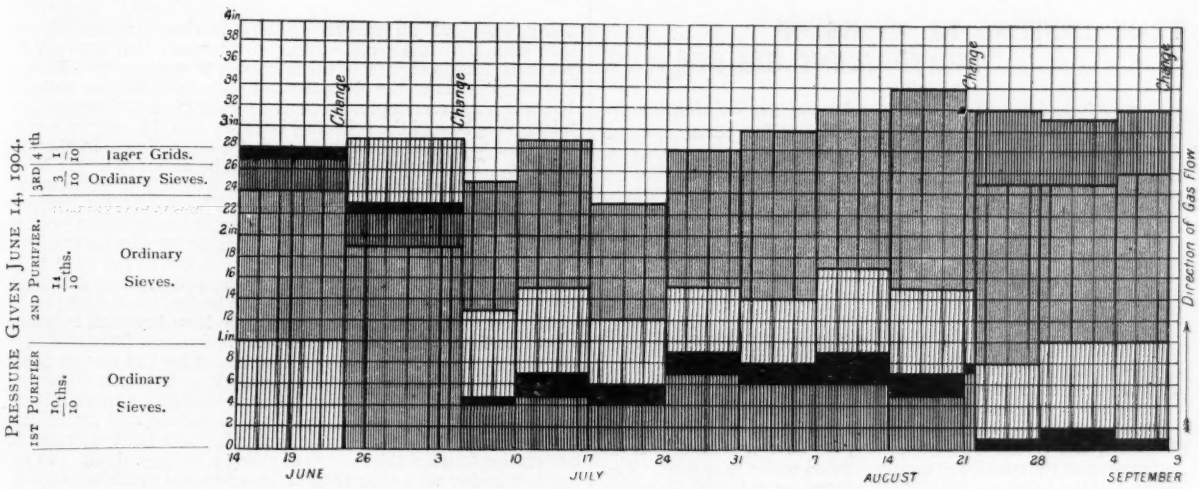


PURIFIER AT THE CHESTER GAS-WORKS, EMPTIED (SHOWING THE NEW DISTRIBUTING CHAMBER), AND READY TO RECEIVE THE GRIDS AND CONDUITS.



THE SAME PURIFIER, WITH HALF THE GRIDS AND CONDUITS IN POSITION.

These results were considered sufficiently satisfactory to justify an extension of the system. But the approach of the busy season only allowed of the conversion of one more purifier in the series; and No. 4 was accordingly taken in hand, and was filled and put in action on Nov. 10. No. 3 was refilled, and put in action on Sept. 10, and came off on Dec. 9, having passed 62,623,000 cubic feet of gas. The material used in this second run of No. 3 was



Diagram, showing the Relative Pressures given by one Purifier fitted on the Jager System, and three working with Ordinary Sieves. Dimensions of Purifiers: 24 ft. by 22 ft. by 5¼ ft. deep.

(Note: *Extent of pressure given by Purifier fitted with Jager Grids shown thus* ▬▬).

Comparative Statement of the Working of Four Purifiers fitted with Ordinary Sieves, and when One or Two of these Purifiers are fitted with Jäger Grids.

—	—	Contact Surface. Total. Sq. Ft.	Contact Surface. Sq. Ft. per 1000 Cub. Ft. of Gas. Max. Make per Diem	Comparative Speed of Gas in Feet per Second. (Max. Make.)	Mass of Oxide. In One Box. Tons.	Mass of Oxide. In Four Boxes. Tons.	Gas Passed per Change. Total Cub. Ft.	Gas Passed per Change. Cub. Ft. per Ton of Oxide in Four Boxes.	Cube of Purifier Used. Per Cent.	Sulphur Taken Up. In. Per Cent.	Sulphur Taken Up. Out. Per Cent.	Sulphur Taken Up. Taken Up. Per Cent.	Pressure given per Purifier. Tenths.	Remarks.
Summer Working. April-Sept.	Jäger Grids	955	..	..	50½	176½	55,895,000	316,685	71·8	21	32·9	11·9	2	During this test (June 14 to Sept. 9), one purifier out of the four was fitted with Jäger Grids.
	Ordinary Sieves	524	..	..	42	..	29,000,000	172,619	60·0	..	..	..	6	
	Increase	431	..	..	8½	..	26,895,000	144,066	11·8	..	..	..	4	
	Increase per cent.	82 p.c.	..	..	20·23 p.c.	..	92·7 p.c.	83·4 p.c.	20·0	..	..	..	66 p.c. Reduction.	
Winter Working. Oct.-March.	Jäger Grids	955	0·888	0·0130	50½	157	35,733,000	227,598	71·8	32·9	45·6	12·7	2	During this test (Nov. 10 to Dec. 21), two purifiers out of the four were fitted with Jäger Grids.
	Ordinary Sieves	524	0·480	0·023	28	..	19,000,000	170,000	40·0	..	..	..	15	
	Increase	431	0·408	0·010 Reduced speed	22½	..	16,733,000	57,598	31·8	..	..	..	13	
	Increase per cent.	82 p.c.	85 p.c.	43·47 p.c. Reduced speed	80·35 p.c.	..	88 p.c.	33·8 p.c.	79·5	..	..	..	86 p.c. Reduction.	

new artificial oxide from Read Holliday and Co.; and the sulphur taken up during the three months' run was 10·5 per cent.

Comparing these figures with the average "all-the-year-round" duty obtained by the ordinary system, there is an increased duty of 38,500,000 cubic feet, equivalent to 160 per cent., and compared with the highest previous record, which was an extraordinary one, the increased duty is 24·81 per cent. No. 4 purifier which was filled on Nov. 10 came "off" on Dec. 21, having passed 35,733,000 cubic feet—a very high duty for the time of year, and an increased duty of 88 per cent. above the winter average. The material used was partly spent Irish bog ore taken from No. 3 on Sept. 9, and containing 32·9 per cent. of sulphur. It now contained 45·6 per cent. of sulphur, having taken up 12·7 per cent. during the run.

But the most remarkable feature of these trials remains to be considered. Every care was taken in filling the purifiers to ensure that the material formed an unbroken mass from top to bottom of the box, between the conduits; and careful observation when emptying the purifiers showed that this had been successfully obtained. The thickness of the vertical walls of material between the conduits is 1 ft. 9½ in. In the ordinary system, the horizontal layers of material are each 1 ft. 6 in. in summer, and 1 ft. in winter, and the pressure thrown by the boxes is generally from 6-10ths to 3 inches each, though this has been occasionally exceeded. The highest pressure thrown by either of the two Jäger purifiers has been 4-10ths; but it has very seldom exceeded 1-10th, and has not averaged 2-10ths. Consequently, we have had no blowing of lutes since these grids were introduced; and I need hardly point out the correlative advantages of reduced load upon the exhauster.

The table appended shows the results obtained in comparison with the summer and winter averages of the ordinary system; but it must be borne in mind that these results are arrived at with "mixed" purifiers—*i.e.*, one Jäger and three ordinary for summer, and two Jäger and two ordinary for winter; and the advantages obtained by the Jäger system are therefore minimized. They may be summarized as follows:—

Increase of contact surface 82 per cent.
Increase of purifying mass (during winter) 80 per cent.
Pressure reduced to 2-10ths.
Speed of gas through the purifying material reduced 43½ per cent., or nearly one-half.

The ease with which the grids are manipulated and the absolute regularity of the density of the material between the conduits are advantages which must be seen to be appreciated. Of the relative labour costs of the two systems, I am unable to give definite figures at present; but that there will be a saving in this direction, I feel assured, as I am also that the Jäger grid system of purification is an immense step in advance of anything which has so far appeared.

Analyses of Accounts of Gas Undertakings.—We have received the "Gas World" analyses of the accounts of gas undertakings for 1903-4. They are contained on four large sheets, 20 in. by 15½ in. (linen backed for strength), and relate to 110 company and municipal gas undertakings; being an increase of 10 in the number dealt with in the analyses for the preceding year, which appeared a little later, and were noticed in the "Journal" at the time. The figures are carried across two sheets; but the eye is assisted by means of faint blue lines dividing the whole of the names into groups of three, and also by the repetition, on the inner margins, of the figures indicating the numerical order. The left-hand sheet furnishes details in regard to manufacture, consumption, and revenue; while on the right-hand one particulars are given as to manufacturing, distribution, and management charges the capital paid up, and the capital per ton and per 1000 cubic, feet of gas, &c.

TRAIN LIGHTING BY MEANS OF INCANDESCENT GAS-BURNERS.

RECOGNITION of the virtues of incandescent gas lighting has no ending. Among the remote places where, a few years ago, one would have been considered greatly daring to recommend its adoption would have been in the lighting of railway carriages; but to-day we feel almost inclined to say that there is no limit, where artificial lighting is a necessity, to the application of the system. For some time past, we have heard, have seen successful examples, and have had good reports, of the utilization on Continental railways of the incandescent gas-burner, both in vertical and inverted form. Hundreds of railway coaches, in fact, on the Continent, have been fitted up on the system of the Pintsch Patent Lighting Company, Limited; but in this country—while isolated carriages have been experimentally run for the purpose of convincing those in authority on our railways that the economy of incandescent gas lighting is not beyond their reach, and that their passengers need not be debarred from the enjoyment of its efficiency while travelling—it is only now that, on the London, Brighton, and South Coast Railway, we have a complete train (composed of thirteen large coaches) fitted with the system. The success of the lighting of this train cannot be gainsaid from the points of view of economy and efficiency; while the brilliance, purity, and whiteness of the light is the admiration of many independent people—people without prejudice for one system of lighting over another so long as the service rendered is equally good—we have met, and who have travelled by the train.

Save in the case of unprogressive railway companies, the oil lighting of railway carriages is doomed; and, for a long time past, the competition in this field of lighting has been chiefly between the Pintsch Company's oil-gas system with flat-flame burners and electric lighting. About electric lighting, we need not say more than this—that the vagaries and expensiveness with which the ordinary consumer has to put up if he prefers that system, are increased when it is used for train lighting. Its installation is expensive, the necessary apparatus adds considerably to the weight of the trains, the working costs are high, and dependence upon the constancy of its illuminating power and service is a thing upon which it is dangerous to stake even one's word. The unreliability, too, has occasionally the effect of disorganizing the traffic arrangements. Our attention, however, is here demanded entirely for dealing with the question of the application of the newer form of gas lighting to this purpose. Of course, in the lighting of trains by this means, it is compressed oil gas and not coal gas that is used; but the relationship is a close one. And it is our interest and the interest of every gas man to foster the application of the system to train lighting in every possible way; for we can conceive of no better advertisement for incandescent gas lighting than this. If it is good in a railway train, where will it not be?

It is convenient here just to give a preliminary glance at the Pintsch oil-gas system for the lighting of railway trains, and the amount of success it has gained. It is approaching thirty years now since the lighting of railway carriages by compressed oil gas was introduced; and those long years have proved both the safety and efficiency of that method of affording passengers light and comfort. Application of the system has been made by most railway companies all over the world. Indeed, upwards of 150,000 carriages and 5000 locomotives have been lighted by compressed oil gas, of which about 75,000 have been fitted in the British Empire, and about 40,000 in Germany. Even in America, where the electric lighting of carriages had been extensively tried, Pintsch's system is now adopted throughout. In England, the light obtained by this system is 8 candles per cubic foot of gas consumed per hour; or, if double-burner lamps are used, 16 candles. The cost of lighting (including depreciation of plant, interest on capital, and working expenses) varies between 0·2d. to 0·3d. per light per hour, according to the cost of fuel and labour, and is considerably less than the cost of lighting by ordinary oil-lamps or electricity—not taking into consideration the greater amount of light obtained. The fittings are simple. A receiver (or gasholder) is fixed in a convenient place to the underframe of the carriages, and is charged with high-pressure gas to 90 or 105 lbs. (6 to 7 atmospheres) pressure per square inch. This receiver is connected by a high-pressure pipe to a regulator or governor, which reduces the high pressure to 1 inch or 2 inches water column pressure, according to the number of lights in the carriage. From the regulator, the gas passes up the end of the carriage along the roof to the lamps through an ordinary gas-pipe. A filling-valve is attached to each side of the sole bar and connected with the receiver; and a gauge is provided near this valve to indicate the pressure in the latter. A main cock is inserted in the pipe to shut off the gas; but, in addition, each lamp is also provided with a small tap, so that any of them can be turned off individually. In many cases a bye-pass cock with a lever and rod is placed against the end of the carriage to turn the lights low if not required; or, if thought desirable, each lamp can be provided with a separate bye-pass.

It is seen, from an inspection of the lamps, that the conversion from the flat-flame system to incandescent lighting is a comparatively simple matter. No alteration is needed to the existing oil-gas supply fittings on the coaches. The only difference is that the regulator has to be altered and adjusted from between 1 and 2 inches water column pressure (which is, as already stated, the ordinary pressure with the old burners) to 8 inches—that is to say, the pressure used is about four times greater than formerly. Then, in the compartments, the old globe and reflector casing are removed. In their place an adaptor (patented by the Pintsch Company, and taking the place of the reflector) is fixed; and this carries a globe arranged to open inside the carriage for convenience in changing mantles. The lamps can be lighted in the ordinary way. When these changes are made, the lamps have merely to be connected up to the gas service-pipe on the roof. There is yet the burner to be dealt with. The Company have brought to our notice both the vertical and inverted forms of incandescent burners for train purposes. Both are of considerable interest, but in the case of the Brighton train, it is the inverted system (with its fine downward light) that is so successfully used—the burner itself being on the principle of, and of course made by, the New Inverted Incandescent Gas-Lamp Company, Limited. The cone is fitted to its connection; and a special form of attachment for the mantle is provided. The cone, though specially made, is but little different in size from that used in the "Bijou" form of the New Inverted Company's burner. It is the study of requirements, and attention to the smallest details, that enable those who have been instrumental in pressing forward this system of railway carriage lighting to look upon it to-day with exceeding satisfaction and confident hopes.

The mantles are an important consideration; and the question of how they stand the constant vibration of a railway train will crop up in every gas man's mind. The mantles are specially manufactured; and each is surrounded by a basket of wire-work—not platinum; that would be too expensive, and quite out of the question. The basket is formed of four descending branches meeting under the mantle; and one wire running round the mantle at the sides. The result is that, when the mantle breaks, it does so, as a rule, near the neck and in large pieces, which are caught and kept in contact with the flame by the basket. So that, by this protective arrangement, in the event of accident, nearly the same amount of light may be depended upon as when the mantle is whole—it being found that the broken mantles can be retained in position in this way for quite a considerable period. All risk of total extinction of light is thus completely averted. At the various carriage-cleaning depôts on a line, a supply of the mantles is kept; so that replacements can be made quickly, and with the utmost facility, should necessity arise.

Before we briefly allude to the vertical form of the burner, there is the important matter of the consumption of gas and the lighting power of the inverted form of the burners. The oil gas used after compression has an illuminating power of 40 to 45 candles; and, with the old form of flat-flame burners, the duty was about 8 candles per cubic foot of gas consumed per hour. The inverted burners give 25 to 30 candle power, with a consumption of only 0·6 cubic foot of gas per hour; so that the saving in gas is enormous, considering the increase in lighting power. Here, as a matter of fact, we have an increase of between 300 and 400 per cent. in illuminating power for about half of the old consumption of gas. This is what puts the incandescent gas system so far ahead in point of economy of other lighting methods—that not only is there a great saving in consumption and consequently cost of gas, but the saving is accompanied by such a vast increase of what is wanted—light. The expense involved in the purchase of the mantles for train lighting (assuming that their life only averaged a month, and it is a great deal longer than that) is counterbalanced, with much to spare, by the saving in gas consumption. This is the experience of to-day.

A few words as to the vertical forms of incandescent burners designed and patented by the Pintsch Company for this special class of lighting. The burners really look ridiculously small when compared with those to which one has become accustomed. One of the burners is only an inch long from the cap. In this, the air supply is taken in immediately below the point of combustion; this being possible by having a steatite nipple so arranged that very complete admixture of the air and gas takes place immediately on the entrance of the former. Otherwise, of course, such a short tube would not be productive of good results. In another form of vertical burner, the bunsen tube is of this shape **V**, with the air-inlets just by the point of connection with the gas-supply pipe. But, it is stated, there is little to choose in respect of efficiency between the two types of burner. The use of the one or the other appears to resolve itself entirely into one of personal choice. The mantle in this case is also specially made, is 2 inches long, and about ½ inch at the bottom; being held in position by an external wire support. The illuminating power with these vertical forms of burner is also from 25 to 30 candles, with a consumption of 0·6 cubic foot of gas per hour. With both the inverted and the vertical forms of burner, if economy in gas consumption is not desired, the Pintsch Company can, by a slight increase in the gas used and in the size of the mantle, easily provide 100-candle power from each burner.

Before the Brighton Company had their train wholly fitted up, one of the carriages had been under trial about three months; and it was through their gratifying experiences on a small scale that they determined to complete the equipment of the train. One or two other British Railway Companies have been similarly experimenting; and more of them now desire to be in the running in this matter. Therefore it is anticipated, with confidence, that incandescent gas lighting for railway carriages has come to stay, alike to the advantage of the railway companies and their patrons.

FOR AND AGAINST THE "DOWSER."

For the past few weeks, the columns of "The Times" have been more or less fully occupied with correspondence on a subject which has probably puzzled many people from the time of Moses down to our own. It will be recollected that, on a certain memorable occasion, the manipulation of a rod, *plus* the temporary possession of supernatural power on the part of the manipulator, had the effect, if we may credit the old chronicle, of drawing water from the "rock in Horeb," so that the pressing needs of the remote ancestors of some of the residents in the East London district of the Metropolitan Water Board might be supplied. It is the use of a rod of a different kind by a much less exalted personage, but for a similar purpose, that has been the subject of the correspondence referred to. The personage in question is the water-finder, or "dowser," and the rod is the instrument by means of which he makes his divinations. A demand has been made that his powers should be systematically tested, with the view of ascertaining whether the signs by which he is enabled to make his predictions are due to the possession of some occult force or merely to the trickery of a skilful conjurer. The reason for reopening this inquiry may be questioned, in view of what has already been done in the matter. But previous investigations have not furnished all the desired information; and consequently there is still something more to be said. The subject is one that cannot be dismissed with the remark that "there's nothing in it." This was recognized by Mr. James Mansergh when delivering his Inaugural Address as President of the Institution of Civil Engineers rather more than four years ago. Sceptical as he admitted he was as to the water-finder's powers, he acknowledged that the work done by him could not be lightly pooh-poohed or summarily ignored; and he expressed his willingness to formulate certain crucial tests, to which, if opportunity occurred, he would invite two or three of the leading dowsers to submit themselves, and lay the results before the members of the Institution. The opportunity has not yet presented itself; and possibly it may never do so. Meanwhile, the matter is not slumbering. As our readers may remember, it has been taken up by the Society for Psychical Research, who have placed it in the hands of Mr. W. F. Barrett, the Professor of Experimental Physics in the Royal College of Science for Ireland. The results of the preliminary investigations made by him have already been published; and later ones will shortly be made known. If, in addition to these, the trials which it was the object of the opener of the correspondence in "The Times" to have carried out, should throw further light on what is admittedly a difficult subject, much good will have been done. Having made these introductory observations to explain the position, we will give some of the points brought forward by the writers of the letters for and against the water-finder.

The first letter appeared just before Christmas. It was written by Mr. J. Wertheimer, the Principal of the Merchant Venturers' Technical College, Bristol, and was to the effect that a West Somerset dowser had consented to submit his powers to a scientific test; and he asked to have placed at his disposal some ground under which there was a stream of water the course of which was accurately known. If he could obtain this, the trials were to be carried out in about a month. The publication of the letter brought two others from writers who questioned the utility of the proposed tests; evidently regarding the professional water-finder as little less than an impostor. One of the writers—Mr. T. W. Dunn—proposed that the dowser should be blindfolded, which he thought would effectually frustrate his efforts at finding water. These letters were followed by one from the Rev. A. R. Price, the Rector of Hethe, Bicester, who related his experience. He had staying at the Rectory a little girl who found in his grounds a spot beneath which she said there was water. On the strength of this statement a well was sunk, and at a depth of 18 feet a strong spring was struck which has never since failed. These were the facts. How were they to be accounted for? The child was too young to be a trickster; and she could scarcely have located the water from geological knowledge. Was this art, experience, or a gift? The next letter was from Mr. Wertheimer, stating that he had had several offers of land, and hoped soon to start the experiments. Replying to Mr. Dunn, he pointed out that his proposed blindfold tests would be inconclusive. He said that if there was any influence external to the dowser which caused him to move the twig unconsciously, it probably acted through the nerves, on the muscles; and therefore blindfolding might interfere with the nervous condition of the operator. It was for this reason that he desired to make the tests, some of which were to be performed by the dowser under the ordinary conditions of his work. Should he fail, it would be one more substantial case against the belief in this kind of divination. On the other hand, his success would furnish "conclusive evidence of the existence of a force at present unknown to scientific men, and well worthy of their study."

Evidence of the existence of this "force" was furnished by the next correspondent, who wrote from the Isle of Man. This gentleman has a niece and a son who find water with a twig; and he says that he has seen the twigs in their hands "working synchronously, and without their connivance." He declares that there is neither "art" nor "magic," but a "power acting through some unknown agency—possibly electric—and confined to a few individuals." One such individual appears from another letter to be a little girl in a Monmouthshire village, who was accidentally made conscious of the possession of it when playing with a twig left in a meadow by a professional water-finder who had previously been over the ground and located water, and had the spots indicated by pegs. The writer who records this case says that "every test has been applied to this child." She has been blindfolded and led over the pegs, and the twig has invariably "erected point upwards," though the two ends have been gripped by independent persons. That the "force" operates upon certain individuals even without the medium of the twig, is shown by the fact that this little girl experiences a peculiar sensation when passing over the located spots. This being so, the conclusion follows that the hazel twig is not a *sine quâ non* of the dowser. Indeed, it is stated that there are people in Somersetshire who can locate water with the main-spring of a watch; and a case of this kind is recorded by one correspondent. A well 120 feet deep, which had supplied the house for many years, was closed on account of the failure of the water; but another source was indicated by a dowser, using a watch-spring, not 20 yards distant, and excellent water was found at a depth of some 32 feet. This operator, it appears, traced springs for about a mile on the estate in question; but he declared that he was unable to account for his action, and was quite unconscious of any feeling, in his arms or otherwise, which acted upon the steel.

So far the weight of evidence has been on the side of the water-finder; and it must be acknowledged that it is fairly convincing. Water has been found by persons who can hardly be suspected of trickery, and it has been done even without the aid of a hazel twig, or of anything whatever. It will now be well to hear what is to be said on the other side; and the first witness who shall speak is Dr. Thresh, the Medical Officer of Health for Essex. Dr. Thresh is a well-known authority on questions of water supply, and is the author of a work on the subject which has reached a third edition. Any expression of opinion put forward by him, therefore, must be accepted as a conclusion arrived at after due investigation. In the book just referred to, he says he has seen the water-finder walk over places where water existed in abundance without the twig indicating its proximity; while he has known a case in which it made strong movements at a point at which he was certain there could be no water within 300 feet of the surface, as the soil was clay. A well sunk, on the strength of the dowser's prediction, to a depth of 100 feet failed to yield any water. In his letter to "The Times," he cites the case of a water-finder who was engaged to visit one of the Colonies with the view of bringing his powers into use. As he was to have a fee of fifty guineas for each parish visited, *plus* expenses, it may be supposed that he did his best to justify his selection. Dr. Thresh says the result was that "failure followed failure;" till at length the Auditor-General declared that public money could not be used for paying for the dowser's fees and expenses, and that the parties who engaged him were personally responsible. He then left the colony discomfited. Dr. Thresh's opinion is that the movement of the twig may be attributed to "unconscious cerebration," except in those cases in which it is provoked wilfully. His experience leads him to the conclusion that the percentage of successes is not greater than may be fairly attributed to accident.

In support of Dr. Thresh, we will next cite the experience of another member of the same profession—Mr. Henry T. Butlin, the well-known surgeon. With the view of obtaining water for a small farm at Onley, about two miles from Rugby, and lying in the valley between the hills on which Rugby and Barby respectively stand, he employed a Lincolnshire dowser, who, by the movements of the twig, indicated a suitable spot for a well. In answer to questions, he said he was confident that sufficient water for the house and farmyard would be found at a depth of 80 feet. The boring was commenced, and sunk to 80 feet, then to 100 feet, and finally to 150 feet, and still there was no more water than might be attributed to surface drainage. The work was consequently abandoned. Later in the same year (1903), the services of another water-finder were requisitioned, and he passed over the old borehole without the rod making any movement. He, however, said he found a spring 12 or 15 yards farther off, and advised that a well should be sunk to a depth of 50 feet. The spot was marked by a peg. Last September, a third dowser was called in, who was, of course, unaware of the previous operations; and he walked over the spots which had been indicated by his predecessors, but without finding water at either of them. Finally, however, after taking a great deal of trouble, and scouring the surrounding fields, he fixed on a point about 150 yards from the farmhouse, where he said a good supply of water would be found. Under the circumstances, Mr. Butlin did not have the borings made at the various places that were indicated by the last water-finders.

An anonymous correspondent, writing on the side of the opposition, expressed the confident opinion that the twig is twisted simply by muscular force, and that this force is not magic, but very clever art. He said if people would take the trouble to carefully watch the muscles of a water-finder at work, they would see very easily how the thing was done, even by a little girl. On the other hand, Mr. Lestock Forbes, a Stipendiary Magistrate, of British Columbia, says to his mind there is neither magic nor art in the business. He has scores of times seen water found by the use of a willow cut in the shape of a catapult stick, only about 2 feet long. According to him, it is a common practice in the North-West Territories and most parts of Canada. He fully believes the willow, like other twigs, has a natural tendency—a

sort of affinity—towards water, and not only finds it, but minerals also, when used by men of intelligence.

Here, for the present, we will leave the subject. The correspondence has not yet been closed, and additional interest has been imparted to it by some contributions by Professor Barrett. We shall deal with these and the remaining letters in a subsequent issue.

BRITISH PROGRESS IN MUNICIPAL ENGINEERING.

In the last number of the "Journal," we briefly referred to the issue of the first of a series of volumes which will contain the lectures on the progress of British industries, for the delivery of which, throughout the Colonies and in foreign markets, arrangements were made some months ago, as mentioned in our columns at the time. It may be remembered that the scheme is being carried out with the assistance of the Board of Trade, the Colonial and Foreign Offices and Governments, and the leading technical and trade institutions; and the work of organizing the lectures has been entrusted to Mr. B. H. Morgan, who, we understand, has received cordial support from the Colonial Governments. The first industry to receive attention under the scheme is that of engineering, in connection with which Sir William Preece, Colonel R. E. Crompton, Mr. James Swinburne, and others, will explain in detail the advance which has been made in recent years; and it will be a special feature of each lecture that it will be illustrated by means of lantern slides of photographs and drawings. We learn that in the course of the next few months readings will take place in all the British Colonies, in the Government Technical Schools of Russia and Austria, in the great educational establishment at Charlottenburg, in similar institutions in France, Italy, and Sweden, and before most of the leading Universities and Trade Societies in the United States. As was mentioned last week, the volume just published contains three lectures by Mr. W. H. Maxwell, Assoc. M. Inst. C.E., Borough and Water-Works Engineer to the Tunbridge Wells Corporation, on the subject named in the heading to this article;* and we give below an epitome of its contents.

Mr. Maxwell introduces his subject by offering a few general remarks on the principal branches of municipal work in which advances have been made. Dealing first with the development of sanitary science, he describes the position of affairs a hundred years ago, and traces the progress made during the Victorian era. He points to the recognition by the State of the importance of sanitary science, and shows that the general effect of the public health law has been improved vital statistics. After sketching the nature of the work done by large municipalities, he passes on to the real subject-matter of his first lecture—viz., road engineering and maintenance. It is generally admitted that the road maker is the pioneer of the civilization and commercial development of all countries; and Mr. Maxwell recognizes this at the very outset. He quotes Ruskin to the effect that "all social progress resolves itself into the making of new roads;" and shows how roads, canals, and railways have influenced traffic and commerce. He sketches the improvements made in roads since 1888, gives some constructional details of road making, and describes the various materials used for paving.

The second lecture is devoted to main drainage, sewage disposal, and destructors. Beginning with the improvements due to the general sanitary reformation of the Victorian era, Mr. Maxwell goes on to show that during the past few decades certain well-considered general principles have been established as the outcome of a judicious combination of theory and practice. The characteristic features of the "combined" and the "separate" system of main drainage are indicated; emphasis is laid on the importance of exercising the greatest care in putting down a system of sewers, so that no pollution of watercourses arises therefrom. The subject of the construction of sewerage works leads to a description of those designed by the late Sir Joseph Bazalgette for the Metropolis. The appliances used in connection with sewers are reviewed; and then the author passes on to deal with the disposal of sewage—a branch of municipal work which has probably engaged more serious attention by the public authorities of Great Britain than any other. The natural modes of disposing of sewage which were sufficient before the concentration of the population in towns became inadequate afterwards; and the result was the introduction of the various modes of treatment at present in use, descriptions of which are given. The rest of the lecture is devoted to the subject of the disposal of the domestic and trade refuse of towns by means of destructors.

We now come to the third lecture, which deals with water supply—a department of municipal engineering which, as Mr. Maxwell very truly says, affects the public health of a community more immediately than any branch of the public service falling within the scope of the duties of a municipal authority. He shows how the responsibilities of the water-works engineer begin with the selection, at its source, of a pure and suitable supply, and then describes the two kinds of works—gravitation and pumping—by means of which the water is conveyed to the consumer. He points out that the question of the selection of one or the other depends entirely upon local circumstances. Speaking generally, the initial cost of a gravitation scheme is greatest; but, on the other hand, pumping works entail a permanent annual expenditure. A map is given showing the gravitation supplies of the large cities in Great Britain; and there are some excellent views of the water-works of the Glasgow, Liverpool, and Bradford Corporations. The case of the London Water Supply is shortly reviewed; and then Mr. Maxwell proceeds to deal with water-works appliances and machinery and their makers. This portion of the lecture is fully illustrated by a very fine series of folding and single-page plates; and it presents a thoroughly representative collection of pumping and other plant. The comprehensiveness of the lecture is shown by the inclusion therein of references to the air-lift system of pumping, and the use of expanded metal for the roofing, and of bitumen for the sheeting, of reservoirs.

The lectures are written in a style which renders them specially suitable for delivery to a general audience; while the lantern slides will help to fix upon the mind some of the facts which language might fail to impress. The value of ocular demonstration as compared with oral instruction was recognized by the Roman poet nearly two thousand years ago, when he wrote: "*Segnius irritant animos demissa per aurem, quam quæ sunt oculis subjecta fidelibus.*" It is unnecessary to emphasize it in these later times, when the lantern slide has invaded even the domain of the learned society. The audience are more likely to go away with a clear idea of the extent, for example, of the Vyrnwy reservoir, dam, and water tower of the Liverpool Corporation, after seeing upon the screen reproductions of the beautiful views with which Mr. Maxwell has illustrated his remarks on this great work, than if they were made acquainted with their magnitude by means of dry details and figures. The object of the lectures, as already pointed out, is to show industrial progress; and, judging by the volume under notice, it has been achieved in the case of the first subjects treated. Appended to each lecture is a classified list of British manufacturers specially interested; and at the end of the book there is another giving the titles and publishers of works on municipal engineering which are considered to be likely to prove serviceable to anyone seeking fuller information on the matters referred to. This notice of the book must not be closed without recognition of the excellence of its typography and general production; and a hope may be expressed that this remark will be applicable to all its successors.

* National Engineering and Trade Lectures. Edited by Ben. H. Morgan. Vol. I. "British Progress in Municipal Engineering." By W. H. Maxwell, Assoc. M. Inst. C.E., Borough and Water-Works Engineer to the Tunbridge Wells Corporation, &c. With numerous illustrations. London: Archibald Constable and Co.; 1904.

PERSONAL.

At the meeting of the Metropolitan Water Board on Friday, the Water and Stores Committee reported that Mr. Walter Hunter, the Engineer of the Grand Junction district, had tendered his resignation as from the 26th of November last.

Judging by the elections made at Friday's meeting of the Junior Institution of Engineers, this organization is attracting to a greater extent than formerly those who are specializing in the gas branch of the engineering profession. We notice among the names no less than six which are identified with the Old Kent Road works of the South Metropolitan Gas Company. They are, placed alphabetically, Mr. R. H. Collins, Mr. C. G. Evans, Mr. T. S. F. Gibson, Mr. C. A. Hart, Mr. W. G. Head, and Mr. H. C. Sims. This is a healthy showing from one station, and is an indication of the amount of appreciation these new members have of the character of the work carried on by the Institution.

A pleasing ceremony took place on Saturday, the 28th ult., in the shareholders' room at the Wakefield Gas-Works (nearly all the officers and workmen employed by the Company being present), when the Chairman, Dr. W. A. Statter, J.P., presented Mr. L. V. Whitaker, the Assistant-Manager, who is leaving to take the appointment of Manager of the Pontefract Gas Company, as announced in our columns a short time ago, with a cheque which had been subscribed for by the Directors and officers, and nearly all the employees. In making the presentation, Dr. Statter said it afforded him personally and all the Directors the greatest satisfaction to see Mr. Whitaker's success; and he heartily wished him God-speed in his new sphere. Mr. G. A. Moorhouse (Director, and a shareholder in the Pontefract Gas Company), who had taken an active part in Mr. Whitaker's candidature, also gave expression to his own and the other Directors' pleasure in Mr. Whitaker's success. Mr. H. Townsend, the Engineer and Manager, voiced the gratification felt by Mr. Whitaker's colleagues and fellow-workmen, and congratulated him on having secured so desirable an appointment, and hoped he would have health and strength to acquit himself in his new position with credit to himself and all his well-wishers in Wakefield, and to the benefit of the Pontefract Gas Company. In acknowledging the presentation, Mr. Whitaker spoke in feeling terms of the severance of his connection with the Wakefield Gas Company, which was endeared to him by so many pleasant associations, and stated that his old colleagues and fellow-workmen would always occupy a warm corner in his heart. He concluded by calling on those assembled to drink to the continued prosperity of the Company; and the proposal was cordially received. Dr. Statter having acknowledged the compliment, the Company's Secretary (Mr. W. H. Parker) proposed a vote of thanks to the Chairman for presiding and to Mr. Moorhouse for supporting him.

SYSTEMS OF TESTING ILLUMINATING GAS.

By "CRITIC."

Running through the summary of Gas Bills to be dealt with in the next session of Parliament, one is struck with surprise to find scarcely any two methods of testing alike in every detail, even if the kind of gas be taken as the same or different. What purpose does this variation serve? Surely it is not for the public good.

It will be exceedingly difficult to use the Sugg No. 1 argand burner in a way to do justice to all gas companies alike, and at the same time be beneficial to the consumers, who are, by the way, seldom thought of when framing these precious documents. The Bills indicate that the framers possessed little practical knowledge of what they have asked in respect to the quality of the gas. An exception can scarcely be made, for they have gone along the lines that indicate old methods, without possessing even a solitary new departure based on reasonable scientific principles. The value of the gas as 13, 14, or 15 candles seems to be the chief object—never mind how it is to be arrived at. Several of the companies' businesses will be unduly hampered (if it be possible to judge) by the testing clauses, should they become law. The London Companies have more particularly described the method of arriving at the value of their gas; but then the approximately $3\frac{1}{2}$-inch flame method is just as likely to be a burden on 16-candle gas as on low quality. The present system of consuming as much gas as will give a 16-candle flame in the chimney often means a $3\frac{1}{2}$-inch flame; and, again, to have a longer flame would only penalize the gas to a greater extent, because the efficiency of the burner is passed. This is one of the reasons why the "London" argand cannot be depended upon for a result—hence the desire for the adoption of a fixed height of flame. But this may just as likely record a lower value to a gas than either the 16-candle flame or 5-foot rate method. Taking into account all the varieties of gas now supplied, it certainly would not settle once and for all the testing trouble, either in London or the country. We want time for experiments and the knowledge from actual supply, before we can say definitely whether such-and-such a gas suits the general public. The subject has been neglected both by advocates and opponents, and put aside owing to its many difficulties—all failing to bring this most important method of testing to a higher state of perfection, and so remove from it the uncertainties and pitfalls that it now possesses. Yet many assert, and rightly too, that it is this restriction of testing which governs the make, if not actually the kind, of gas per ton. All such restrictions may be harmful, particularly when they directly affect the yield of gas obtainable from coal, because by so doing they affect the selling price per 1000 cubic feet.

It has been shown that enrichment is not necessary for the public good; and therefore it is not a little surprising to find two of the three London Companies combining in the advocacy of a $3\frac{1}{2}$-inch flame. Evidently they must in their wisdom see a possibly greater benefit in store for them. But the views of the Chairman of the Commercial Gas Company, expressed at the ordinary meeting in August last, indicate a change of opinion. He then said: "Now I think that we should claim, and maintain our claim, that there should be no departure from the principle which was laid down so long ago as 1868, and has been continued ever since—that the burner for testing the illuminating power of gas should be such as is most suitable for obtaining from the gas the greatest amount of light. . . . That is just to the Company and just to the consumer; and any departure from that would be both unjust and inequitable. I think there should be no going away from this point, and we should go on until we get justice." This may indicate that the Company have experimented and found some difficulty in doing better than adopt the $3\frac{1}{2}$-inch flame.

Where is the "Wandsworth" burner, advocated by many, and shown by Mr. Jacques Abady when lecturing before the North of England Association of Gas Managers to "yield consistently the highest results"? Now these results have only come under notice; and considering they were made on five different gases, it is surprising they have not carried greater weight. Evidently they have been found wanting; and the writer thinks justly so, for how was it possible to burn 5 cubic feet of any but two of the gases? It is such wide statements or figures, following otherwise carefully prepared tabular statements of methods, that make one hesitate about adopting any new system. Apparently one company other than the Wandsworth and Putney Company is enough to be bitten with this burner.

In order to show that what has been already stated about the $3\frac{1}{2}$-inch flame is true, it will be well to take published figures. The reader may refer to Mr. Abady's "Table C" results, because every precaution was said to have been taken to prevent inaccuracy entering into them. Now in the case of B. No. 7, the gas was burned to give a 3-inch flame, and the result was 15·9 candles; yet when the chimney was full of flame, the result was the same, while the "Wandsworth" burner gave 16·75 candles as the value of the gas. Secondly, C. No. 8, only shows over No. 7 test (14·3-14·5) 2-10ths of a candle improvement by having the chimney full of flame. The "Wandsworth" burner gave 15·35 candles, or an increase of nearly a candle. Thirdly, D. and E. No. 3 represent 13·6-candle coal gas and mixture, and are found to be of the same value when burnt by method No. 7 (a 3-inch flame); while the "Wandsworth" burner records 14·9 and 14·5 candles as the value respectively for each kind of gas. The only conclusion one can come to on studying these figures is that something went wrong with the apparatus unknowingly, or the methods were faulty in the extreme. It may be said that these are not parallel tests; but at least they embrace those in the proposed legislation on gas testing.

Mr. Abady's recommendation and advocacy of the system put forward by Mr. Charles Hunt many years ago—*i.e.*, to burn the gas at such a rate as will fill the chimney with flame in the "London" argand—is simply a direct step backwards when compared with the present Gas Referees' methods. The $3\frac{1}{2}$-inch flame means a moving light; and with this there are always difficulties and errors cropping up which cannot be foreseen on the table photometer, and even if quite accidental, are best avoided. With the Referees' plan, both lights are fixed (an advantage claimed in bygone days); and since the gas must, in every possible case, flow through the meter, the latter is the only variable factor entering into an adjusted table photometer. Consequently, it is extremely difficult to give a wrong result.

It is not so long ago we read that the "London" argand could only develop properly the gas when burnt with a 16-candle flame, and so has been ever since so used to consume 14 and 16 candle gas. The burner also was marked "14 and 16 candles;" but, from the light of to-day, clearly it could never efficiently consume either quality, and so now we find the burner is only stamped "16 candles." To-morrow it may be stamped "19 candles," and the day after "20 candles." But what about its efficiency as a developer of light per cubic foot of gas consumed by it? This is apparently ignored; and the only question put by experts is how much gas can burn in the chimney—which may often be $7\frac{1}{2}$ cubic feet, or 50 per cent. above that recommended by the Board of Trade Committee and advocated by the London County Council. Evidently the London County Council desire to see the gas better developed in the chimney, and consequently do not understand why consumers should have to burn so much gas in order to get the quality they pay for. They are not against a reasonable variance in the rate of consuming the gas, as is evidenced by the present method of testing. It is the form of measure they object to because it does not indicate economy from a consumer's point of view. When the gas companies generally aim at reducing the price, and at the same time demonstrate that the gas supplied is of parliamentary value by consuming not the most but the least possible quantity, there will be less obstruction and far more patronage by way of extra consumers. Incandescent burners cannot be considered as valuers of this commodity, more especially since Professor Lewes has demonstrated that a good light can be obtained from a gas void of any self-illumination.

THE "KHOMA" GAS-LAMP.

VISITORS to the International Gas Exhibition at Earl's Court will probably remember the twelve four-mantle lamps—named the "Khoma"—which Messrs. Clark W. Harrison and Co. had on view at their stand. We have received the interesting information that these lamps were burning continuously, for eleven hours a day, over 29 days, and that (as shown by the gas bill) the gas consumed averaged less than $\frac{1}{2}$d. per lamp per hour. This lamp is a new one; it only having been patented in this country last year. There are features in both the interior and exterior forms of the lamp which have not been hitherto noticed in the "JOURNAL," and which have for their object the enhancing of both efficiency and convenience in the maintaining of good results. Of the effective lighting power of the lamps, the display made at the exhibition admits of no manner of doubt.

A little explanation will acquaint readers with the chief of the special points referred to. Taking first the form of the four-mantled lamp intended for interior lighting. The most striking feature is the patented superheating chamber or gas-reservoir. There are some people who have doubts as to the value of heating gas used for incandescent lighting preliminary to combustion. The question may be simply settled, each one for himself, by comparative photometrical tests. The idea has received the support of many careful scientific investigators. Among the latest to carry their researches into this particular field are Drs. F. Haber and F. Richardt, whose valuable dissertation on "The Bunsen Flame, and Methods for the Chemical Determination of Flame Temperatures" was noticed at some length in the "JOURNAL" for the 31st ult. Being towards the end of that article, it may have escaped the attention of some readers that there these investigators said: "The temperature of combustion of a gaseous mixture may be raised by a preliminary warming of the gas at the expense of the combustion products (as in regenerative furnaces), but not at the expense of the burning gas itself—that is to say, by subsequent, but not simultaneous, warming." This statement lends confirmation to the claims by Messrs. Clark Harrison and Co. that the superheating chamber on their lamps increases the temperature of the flame, and consequently heightens the incandescence of the mantle for the same consumption of gas. The superheating chamber is placed directly in the heated zone just over the mantles. The gas is thus held in the heated zone sufficiently long to become superheated and rarified before it reaches the burner. In its rarified condition a far better

mixture with the air is no doubt effected; and it is claimed that perfect combustion is attained. Here, in fact, we have an adoption of the principle of the regenerative furnace. The makers state that this patented feature of their lamp increases its efficiency from 20 to 30 per cent.

With regard to the outdoor type of the "Khoma" lamp, there are different features to be noticed. Generally accepted points about high-power lamps—particularly those employed for exterior lighting—are that ordinary chimneys are a nuisance, that their frequent destruction brings in its train an undue amount of injury to mantles, and that the greater the facilities provided for maintaining the lamps in a state of cleanliness and good working order the better. The "Khoma" gas arc lamp for exterior lighting possesses a patented mantle-protector, which does away with the necessity for chimneys, and enables one to clean the globe or replace a mantle without the risk of losing the other mantles through inimical atmospherical conditions at the time. This mantle-protector is in the form of a copper cylinder attached to the top of the globe; and consequently, when the globe is lowered, it assumes a protective position around the mantles. It also prevents the globe from dropping. In it a door is provided to allow access to the mantles when the globe is lowered. The mantle protector may be revolved round the burners so as to bring the door to a position opposite the direction from which the wind is blowing. The lamp, too, is hung on a ball-and-socket joint, so that the burners themselves may be revolved, and any mantle brought round to a position near the door. The lamp burns at ordinary gas pressure, and gives, we are informed, 500 to 600 candle power with a consumption of 15 to 20 cubic feet of gas per hour, according to the pressure of the gas.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

The Fifth Annual Dinner of the Association was held at the Exchange Hotel, Manchester, on Saturday evening. There were nearly fifty members and friends present; and after the tables were cleared, a capital musical programme was gone through. The chair was occupied by the President, Mr. H. Smith, of Bury.

In proposing the toast of "The President," Mr. Garlick said he was sure Mr. Smith was doing his utmost for the Association, and wished him long life and health. The President, in reply, said he did what he could for the Association; and poor as his best might be, he hoped to leave some mark behind to show that he had been President. Mr. Halliwell proposed "Kindred Associations." Four years ago, he remarked, he could not have proposed such a toast; but in 1902 they had a sister in the South, the year following one in Yorkshire, and latterly twins had been born across the border. They seemed to be flourishing, too, for he noticed that the membership of the new arrivals was more than the other three Junior Associations together. Mr. E. E. J. Anderson, replying, said that the sooner the Senior Associations opened their meetings to the juniors, the better. Speaking as President of the North of England Association, he could see no need of Junior Associations in the North, as he believed juniors were allowed those privileges in the North British Association. Mr. Ginman proposed "Our Guests." He remarked that they as an Association were deeply indebted to their guests and to those who unfortunately had expressed inability to be present. They were indebted to them all for their kindness, assistance, and advice. Mr. Tim Duxbury said it was rarely they had a toast to visitors given so heartily. He thanked them for the privilege of being present. While not a member, he felt he had a certain connection with the Association; and he thought he had some little to do with it at the first. Personally, he saw the need of such an Association. If they wanted to make headway and compete with electricity, they would have to bring those up to do it in such Associations. He had read the papers given at their meetings; and he thought that many engineers had found in them food for thought. He expressed a wish that the juniors should be able to hear papers read at the seniors' meetings. Personally, he was in favour of some meetings being thrown open. There was never more competition than at present; but they had improved plant and systems of lighting—two weapons by which they were well able to fight any competition. If, however, they simply rested on their oars, they would find that some day they were not safe. Mr. Rhead, in speaking on behalf of the teaching staff of the Technical School, assured the members of his assistance and his readiness at any time to give a paper. Mr. Cranfield proposed the toast of "The Association," to which he wished continued and increased prosperity. They had a history to look back upon with pleasure. They were the forerunners of a movement that was spreading. They had the very warm friendliness of the seniors. He was much struck with what Mr. Anderson had said regarding the juniors' privileges in the North, and the granting of copies of the papers read. He hoped the other Associations would do likewise. It would be a good opportunity for some of the best papers of the juniors to be included, if deemed worthy; and it would be a valuable service, and highly appreciated.

STUDIES ON THE CLAUS KILN REACTION.

Further Investigations by Messrs. Carpenter and Linder.

In previous issues of the "Journal," reference has been made to the important series of investigations on the Claus kiln reaction which have been conducted by Mr. Forbes Carpenter, the Chief Inspector under the Alkali Works Regulation Acts, and his Assistant, Mr. S. E. Linder, B.Sc. The progress of their work was described in the issue for the 12th of July last (p. 112); and further particulars were laid before the Liverpool Section of the Society of Chemical Industry about the middle of December. The object of these latest investigations was to ascertain the influence of various contact substances on the interaction of steam and hydrocyanic acid in the absence and in the presence of sulphuretted hydrogen and air. The results are fully set out in the paper, which appears in the current issue of the Society's "Journal."

After some few introductory remarks, in which the authors describe the arrangements and the methods of analysis and calculation, they take up the first branch of their subject.

Interaction of Steam and Hydrocyanic Acid in the Absence of Sulphuretted Hydrogen and Air.

In these experiments, three contact materials were tried—broken brick, oxide of iron, and Weldon Mud. Each of these was reduced to fragments of approximately the same size, and presented to the gas under similar conditions. The experiments with the broken brick preceded the others, and were subject to minor irregularities of procedure and defects of apparatus that were eliminated later; and their removal facilitated the collection of the gaseous reaction products. The results are tabulated and shown graphically; but they may be summarized as follows:—

Broken Brick.—Appearance as charged, dull red; as withdrawn, black. Volumes of reacting mixture (excluding steam) varied from 3580 c.c. to 4465 c.c., measured at 0° C. and 760 mm. Duration of experiments, 42 to 106 minutes. The gas analyses are approximate only, except in one experiment—the last of the series in point of time—when the apparatus and procedure were identical with those in the case of the oxide of iron and Weldon Mud contacts.

The conclusions drawn are as follows: (1) That within a range of temperature from 465° C. to 625° C., the amount of hydrocyanic acid converted into ammonia approximates to 80 per cent. when the rates of flow are equal. (2) That the results are characterized by the escape of hydrocyanic acid undecomposed; the amount of this body showing marked increase with accelerated rate of flow. (3) That carbon monoxide and hydrogen are constant products of the reaction; the latter being in marked excess. That decomposition to free nitrogen is not very pronounced, even at the highest observed temperature—625° C.

The results clearly indicate that the following reactions are both operative from 465° to 625° C.—

$$(1)\quad HCN + H_2O = NH_3 + CO$$
$$(2)\quad CO + H_2O = CO_2 + H_2$$

Oxide of Iron.—This sample was the oxide used in a gas-works Claus kiln, previously ignited to expel water. Appearance when charged, ochreous; as withdrawn, dull brick red. Volumes of reacting mixture, 3500 c.c. throughout, at 0° C., 760 mm. Duration of experiments, 87 to 92 minutes.

The following conclusions are drawn: (1) That the yield of ammonia reaches a maximum (96·5 per cent.) at about 280° C., then rapidly falls. (2) That the results are characterized by absence of undecomposed hydrocyanic acid. (3) That carbon monoxide and hydrogen are products of the reaction below 350° C.; at higher temperatures—*e.g.*, 500° C.—both these bodies suffer oxidation by interaction with the contact material. That oxidation of ammonia (or hydrocyanic acid) to free nitrogen is not marked below 350° C., but very pronounced above 500° C.

The results indicate that reactions (1) and (2), given above, both occur with a range of temperature from 200° C. to 350° C. At 500° C., the sole products are nitrogen, carbon dioxide, and ammonia.

Weldon Mud.—Physical condition, as used for gas purification, dried by gentle ignition. Appearance when charged, black; as withdrawn, reduced to lower oxide at the inlet end—7 inches of the column being pale brown, the remaining 15 inches quite black. Volumes of reacting mixture, about 3800 c.c. throughout, at 0° C., 760 mm. Duration of experiments, 90 minutes throughout.

The conclusions drawn are as follows: (1) That the yield of ammonia never exceeds 75 per cent. (2) That the results are characterized by hydrocyanic acid escaping undecomposed below 150° C., and by appearance of free nitrogen above 200° C. (3) That carbon monoxide and hydrogen do not appear among the products at any temperature within the observed range, 150° C. to 200° C.

The results indicate that Weldon Mud exerts a much more powerful oxidizing action upon the reaction products than oxide of iron; no carbon monoxide or hydrogen surviving to indicate the occurrence of reactions (1) and (2) given above.

The authors next proceed to consider the second branch of their subject.

INTERACTION OF STEAM AND HYDROCYANIC ACID IN THE PRESENCE OF SULPHURETTED HYDROGEN AND AIR.

In these experiments, the apparatus and procedure remained as before; the only difference being the addition of sulphuretted hydrogen and air to the reacting mixture. The proportion of air was adjusted to be in moderate excess of that required for exact decomposition to sulphur and water (2·5 air to 1 H_2S). Three contact materials were tried, under similar conditions as before; the results are tabulated and are graphically presented. Less importance is attached to the nitrogen figures in these experiments, on account of the large proportion of air present in the reacting mixture, the nitrogen in which has to be deducted before that produced in the reactions can be arrived at. The figures for carbon monoxide and hydrogen, on the other hand, not being subject to such correction, are regarded as substantially correct. The following is a summary of the results:—

Broken Brick.—Condition, as withdrawn from use in previous experiments. Volumes of reacting mixture (excluding steam) varied from 3670 c.c. to 4165 c.c. at 0° C., 760 mm. Duration of experiments, 90 to 93 minutes.

The conclusions drawn are as follows: (1) That the presence of sulphuretted hydrogen and air, in moderate excess, favours a high yield of ammonia, without sensibly modifying the character of the products. (2) That the proportion of air favourable to a maximum yield is 3·2 air to 1 H_2S. (3) That the results are characterized by absence of nitrogen and undecomposed hydrocyanic acid, and by presence of both carbon monoxide and hydrogen, when the proportion of air does not exceed 3·2 to 1 H_2S. With a much higher proportion of air (6 air to 1 H_2S), free nitrogen, ammonia, carbon dioxide, and water are the sole products.

Oxide of Iron (Sulphided).—The sample used was that withdrawn after use in the small laboratory kiln for previous Claus kiln experiments. Its appearance as charged was dull red and grey; as withdrawn, black. The volumes of reacting mixtures varied from 3270 c.c. to 3615 c.c. at 0° C., 760 mm. Duration of experiments, 86 to 90 minutes.

The following conclusions are drawn: (1) That the presence of sulphuretted hydrogen and air favours a high yield of ammonia. (2) That results are characterized by absence of undecomposed hydrocyanic acid and of carbon monoxide and hydrogen.

Weldon Mud (Sulphided).—The sample used was that withdrawn from the laboratory kiln in 1899, and similar to that used in the Claus reaction tube experiments. Its appearance as charged and withdrawn was light brown. The volumes of reacting mixture were about 3450 c.c. at 0° C. and 760 mm. throughout. Duration of experiments, from 86 to 92 minutes.

The following conclusions are drawn: (1) That the presence of sulphuretted hydrogen and air favours a high yield of ammonia, and greatly modifies the nature of the products. (2) That the proportion of air favourable to the maximum yield of ammonia is 2·7 to 1 H_2S, with a temperature of 380° C. (3) That the results are characterized by the presence of carbon monoxide and hydrogen, and by the absence of nitrogen over a range of temperature from 220° C. to 380° C.

Distribution of Recovered Ammonia.—The presence of ammonium sulphate in the sulphur recovered from Claus kilns in gas-liquor works, and its relation to the nitrogen entering with the saturator gases in the form of hydrocyanic acid, was fully discussed in the authors' previous paper. The question was regarded as one of importance, both practical and theoretical, and attention was therefore specially directed in the present research to the estimation of the various oxidized sulphur compounds of ammonia present in the residual gases resulting from the interaction of steam and hydrocyanic acid in presence of sulphuretted hydrogen under conditions approximating to those existing in the Claus kiln itself. To this end, the residual gases from the contact material were made to pass through a layer of asbestos fibre before leaving the combustion tube for the acid catch, with the view of filtering out any solid bodies that might be induced to separate by contact with a porous material at a comparatively low temperature (100° C. to 200° C.) before reaching the acid catch, where such products would be subject not only to large dilution, but also to decomposition by secondary reaction with the half-normal acid present to retain ammonia. The asbestos fibre was extracted with cold water at the end of each experiment, and the filtered extract submitted to separate examination. The quantitative results are fully set out in tabular form, with the analyses of the corresponding catch liquors. Ammonia as sulphite and thiosulphate was determined by Richardson and Aykroyd's joint iodine and acidimetric method. A united figure for ammonia as pentathionate and sulphate was arrived at by difference—the presence of these bodies being identified qualitatively by ammoniacal silver nitrate and barium chloride respectively. Similar methods were employed for the analysis of the acid retort catch liquors.

The authors regard the analyses of the asbestos fibre extracts as affording undoubted evidence of the presence of oxidized ammonium sulphur compounds as direct products of the combustion tube reaction. On the other hand, the thiosulphate and sulphite found in the acid catch liquors are undoubtedly derived in some measure from secondary reactions, and little or no significance can be attached to these figures. Those for ammonia as carbonate and sulphate are less open to objection, and are regarded as approximately correct.

The conclusions are briefly summarized as follows:—

Weldon Mud (Sulphided).—Temperature low, not exceeding 380° C. Results characterized by presence of small traces of oxidized sulphur compounds in the asbestos filter, and by absence of sulphate in the catch, the bulk of the ammonia appearing as carbonate.

Oxide of Iron (Sulphided).—Temperature high, 480° C. to 520° C. Confining attention to one experiment, the results are characterized by the presence of oxidized sulphur compounds of ammonia in the asbestos filter, and by the absence of sulphate in the catch.

Broken Brick.—Temperature high, 565° C. to 580° C. The results are characterized by the absence of pentathionate, sulphate, and thiosulphate in both the asbestos filter and the acid catch; and by the large proportion of ammonium carbonate.

For comparative purposes the authors presented in graphic form some of the more important features of the first two tables in their paper; and in one appendix gave a number of examples of the experiments carried out.

In the course of the discussion on the paper,

Mr. COLEMAN inquired whether Mr. Carpenter considered that the protecting effect of the diluting gases was due to the proportion of the gases present or to their specific nature—whether any kind of gas would have a protecting effect.

Mr. MAX MUSPRATT said the influence which sulphuretted hydrogen seemed to have upon the reactions described was very striking. He asked whether Mr. Carpenter had made any experiments upon the condition of the surface of the contact material after the experiments in which sulphuretted hydrogen was used. Had the sulphuretted hydrogen actually formed a sulphide coating upon the contact material, so that approximately neutral results were obtained as with brick, or did the gas, as such, in some way modify the reaction?

The CHAIRMAN (Mr. Eustace Carey) asked what Mr. Carpenter thought ought to be done in practice to increase the yield of the valuable products which could be obtained, and which exist in those gases, or whether he intended to leave it to the practical men to draw their lesson from the experiments he had made and reported. Had Mr. Carpenter any idea whether the practical results on the large scale would be different from those obtained in the laboratory?

Mr. CARPENTER, in reply, said he certainly considered that the protecting effect of the diluting gases in the second series of experiments was due to their specific nature, because in the first series they had practically the same volume of permanent gas accompanying the hydrocyanic acid—viz., carbonic acid from the cylinder—and the only other neutral gases in addition to carbonic acid were small quantities of oxygen and nitrogen. As compared with the small Claus kiln of the preceding paper, they got their carbonic acid generally, on passing through that apparatus, within 2·5 to 3 per cent. of that entering. This exit gas contained about 95 per cent., against 98 per cent. going in. In the present series, inlet and outlet tests gave practically identical figures. In answer to Mr. Muspratt, the oxide of iron contact material was analyzed in the first series of experiments as regards certain substances that they looked for, and also the sulphided material, before and after use. Before use the oxide was such as was used in the Claus kiln, and there was no ferric sulphate. The same was the case after use; there was no ferric sulphate, and only a trace of calcium sulphate. The ferric oxide was estimated before and after; and it had maintained its character throughout. In the sulphided material, as had been explained in the paper, the previous experiments with it had been conducted at low temperatures, so that some ferrous and ferric sulphate was present. This had nearly disappeared in the course of the early present experiments. In the sulphided Weldon Mud, there was no manganese sulphide present before use, but they found 4·3 per cent. after use. The Chairman had asked a difficult question as to the practical considerations arising out of the work. He looked upon it as giving warnings to technologists rather than suggestions to be followed, because the hydrocyanic acid was so much more valuable than ammonia that all the aims of technologists had been to produce the acid from ammonia rather than ammonia from the acid. Then Mr. Carey had asked a question as regarded the practical suggestions that seemed to arise from the research that had been conducted with a view to the examination of the products from the Claus kilns used in gas-works. At the meeting of the Section in April last, when he dealt with the subject, a member indicated that he would choose a contact material that would destroy the ammonia; and he asked if such experiments had been made. The work of the present paper sketched out the answer. As regarded the materials used, the potassium cyanide did contain small quantities of some other salts, chiefly potassium carbonate. In their gas analyses, they had to allow for a certain quantity of carbonic acid from this source; but it was a very small amount. The analyses of the contact materials used were given in the paper. They confined their research purely and strictly to the hydrocyanic acid, not complicating it with any other product except those which accompanied it on a large scale—the sulphuretted hydrogen and carbonic acid in gas-works practice. Mr. Clayton had been kind enough to make a suggestion at the last meeting as to whether the methods of analysis of Walter Feld, who had given some extremely useful methods of analyzing crude cyanide compounds, had been found satisfactory in such work as Mr. Linder and himself had described in their previous paper.

Feld's process for the estimation of hydrocyanic acid in presence of sulphides was a simplification of the process that Mr. Linder had independently devised. On the addition of lead nitrate to the cyanide before distillation, the solution did become acid by hydrolysis, so that there was no necessity to add an acid like tartaric. He might say that the presence of other than traces of cyanide in gas liquors was a decidedly unusual thing. There were so many other bodies waiting to combine with ammonium cyanide in its passage from the retort to the cooling and scrubbing apparatus, that to find it in notable amount in a gas liquor was not common, in their experience. He had not been prepared for the almost complete accuracy in estimations by Feld's methods which they found from various materials used. He hoped some day to hear a paper connected with the cyanide industry on the point under notice.

THORIUM MINERALS IN CEYLON.

There was issued last week from the Stationery Office a series of reports on the results of the mineral survey in Ceylon in 1903-4, by Professor Wyndham R. Dunstan, M.A., F.R.S., the Director of the Imperial Institute. In the course of the chief report, he makes the following remarks on the subject of thorium minerals.

By far the most important discovery connected with the operations of the Mineral Survey is that of several minerals containing thoria, which have been made the subject of a separate report. The mineral supposed to be uraninite or pitchblende, and previously forwarded as such to several persons in England, proves on complete analysis at the Imperial Institute to be a new mineral, which it is proposed to name "Thorianite." This mineral is one of the richest known in the rare earth thoria, of which it contains more than 75 per cent. uncombined with silica.

Thoria is of commercial importance, and of very considerable value on account of its employment in the manufacture of incandescent gas-mantles. The material is scarce, and at present is chiefly extracted from the monazite sands of Brazil, which contain from 5 to 10 per cent. of combined thoria. The announcement of the discovery of thorianite in Ceylon, as well as "thorite," the silicate of thoria, containing over 65 per cent. of thoria, has created great interest in England and the Continent, and many offers have been received to purchase the material or work the deposits at remunerative prices. At present, however, Mr. Coomaraswamy reports that only relatively small quantities (a few tons) are in sight. It is important that the occurrence of thorium minerals should be made the subject of thorough investigation throughout the island.

I may add that the doubts expressed by Sir William Ramsay, who had previously received the new mineral from Ceylon as pitchblende, as to the presence of thorium in the mineral, have proved to be without foundation. Commercial exploitation of these minerals now only awaits trustworthy information as to the extent of their occurrence. There are several English firms ready to take up the commercial development of the Ceylon minerals as soon as circumstances permit. I consider it probable that thorianite, containing over 70 per cent. of thoria, may command, at the present time, as much as £30 per hundredweight in the English market.

The following is the separate report referred to above by Professor Dunstan.

The specimen, supposed of uraninite, forwarded by Mr. Coomaraswamy was stated to have been found and identified by Mr. Holland in the refuse from gem washings near Balangoda, in the Sabaragamuwa Province. In his last report, Mr. Coomaraswamy states that he has observed what is apparently the same mineral in a vein of pegmatite at Gampola, in the Central Province. The mineral occurred in small black cubical crystals, the specific gravity of which was determined to be 9·32. On analysis, it furnished the following results :—

	Per Cent.
Thorium oxide (ThO_2)	76·22
Cerium oxide (CeO_2) / Lanthanum and didymium oxide ($La_2O_3Di_2O_3$)	8·04
Zirconium oxide (ZrO_2)	trace
Uranium oxide (UO_3)	12·33
Ferric oxide (Fe_2O_3)	0·35
Lead oxide (PbO)	2·87
Silica (SiO_2)	0·12
	99·93

The analytical results show that this mineral is clearly not uraninite or pitchblende, since the percentage of oxide of uranium is only about 12, while the principal constituent is oxide of thorium (thoria), which is present to the extent of over 75 per cent.—an amount far higher than that contained in any mineral hitherto known.* This mineral appears to be new, and I suggest for it the name of "Thorianite." Since it is radio-active, it will, no doubt, be found to be an important source of radium and radio-active earths, and will probably furnish helium—points which it is intended to investigate as soon as more material has been received.†

A second part of the same specimen of mineral has also been submitted to analysis, with the following results, which show that the material is of fairly uniform composition ; the differences observed being apparently due to inclusions of zircon in the second portion analyzed.

	Per Cent.
Thorium oxide	72·24
Cerium oxide	6·39
Lanthanum and didymium oxide	0·51
Zirconium oxide	3·68
Uranium oxide	11·19
Ferric oxide	1·92
Lead oxide	2·25
Silica	1·34
Insoluble residue	0·41
	99·93

The second of the minerals examined was forwarded by Mr. Coomaraswamy as part of the fourth consignment, and provisionally identified by him as monazite. It had been found by Mr. Holland in the same gem washings at Balangoda. This mineral consisted of fragments of a dull brown colour, exhibiting, when fractured, a purple-brown interior with a resinous lustre. The specific gravity was 4·98. An analysis furnished the following results :—

	Per Cent.
Thorium oxide (ThO_2)	66·26
Cerium oxide and C earths (CeO_2)	7·18
Zirconium oxide (ZrO_2)	2·23
Uranium oxide (UO_3)	0·46
Ferric oxide (Fe_2O_3)	1·71
Calcium oxide (CaO)	0·35
Phosphoric oxide (P_2O_5)	1·20
Silica (SiO_2)	14·10
Water (H_2O)	6·40
	99·89

This mineral is, therefore, not monazite, but thorite, being chiefly composed of thorium silicate. Both these minerals are under further investigation.

It is obvious that, apart from the scientific interest attaching to the determination of their composition, the discovery in Ceylon of two minerals rich in thoria, now so largely employed for the manufacture of incandescent gas-mantles, may be of considerable commercial importance ; and I shall await with much interest Mr. Coomaraswamy's further report on the extent of their occurrence in Ceylon. I shall be glad to receive larger specimens for further investigation.

COLOURED SULPHATE.

The following experiments may be of interest to those troubled by the production of blue, &c., instead of white or grey sulphate of ammonia.

During a certain period of the manufacture from gas liquor of sulphate of ammonia, some difficulty was found in producing a salt that was white or grey, and, further, would keep its colour. The salt in question, though discharging from the saturator white in colour, would, after exposure to the air on the drying floor, gradually turn blue. This changing of colour has been ascribed by Leriche ("Rev. Phys. du Chimie") to the formation of "Berlin white," brought about thus : The ferrocyanide of ammonia in the ammoniacal liquor splits up during the distillation into cyanides of ammonia and iron, the iron cyanide being insoluble—

$$(NH_4)_2\ Fe\ (CN)_6 = 4\ NH_4CN + Fe\ (CN)_2$$

The ammonium cyanide passes with the other gases into the saturator, where, if the acid is fairly strong, it is decomposed into ammonium sulphate and hydrocyanic acid—

$$2\ NH_4CN + H_2SO_4 = (NH_4)_2SO_4 + 2\ HCN.$$

If, however, the saturator is only slightly acid, the sulphuretted hydrogen at a temperature near 212° causes the precipitation of oxides of iron. The addition of strong acid brings about the formation of a white precipitate—*i.e.*, Berlin white—$Fe\ (NH_3)_2\ Fe\ (CN)_6$. This latter, on exposure to air, is oxidized to Prussian blue, which gives the sulphate its blue colour.

With the object of proving this theory, tests were made on the ammoniacal liquor, the acid used, and the sulphate produced. The liquor contained approximately 10 grains of ammonium ferrocyanide, together with 130 grains of sulphocyanide per gallon. The acid, as originally received, showed, as a mean of a number of tests, 80·4 per cent. of sulphuric acid, and contained also as an average 31 grains of iron per gallon ; the maximum being 54 grains, and the minimum 24 grains, per gallon. The next point was to test the sulphate made, when the acid in the saturator was nearly neutral. The time chosen was opportune, for it was found that the still had recently "primed." The acid in the saturator was immediately tested and found to be only 49° Twaddel. On discharging the sulphate made during this period, it was white in colour, but gradually changed ; so that after eight hours' exposure to the air, it was distinctly blue. This seemed to bear out Leriche's theory ; but it was decided to arrive at more definite conclusions. Prussian blue being readily decomposed by caustic soda, it was thought that this would serve as a means for its detection. Accordingly 10 grammes of the blue sulphate were digested with caustic soda, and the solution filtered. To the filtrate a few drops each of ferrous sulphate and ferric chloride solutions were added, and then hydrochloric acid. The precipitated blue was filtered off, decomposed by caustic soda, the ferric hydroxide filtered off, dissolved in dilute sulphuric acid, and

* Specially separated fragments of the mineral, analyzed since the above was written, contained nearly 80 per cent. of thoria.

† Since this was written, Sir W. Ramsay has stated that radium is present in the mineral, and that it furnishes considerable quantities of helium.

the iron determined by potassium permanganate solution. The iron thus found was equivalent to 0·1228 per cent. by weight of Prussian blue.

At one time, also, a salt was obtained tinted with practically all the colours of the rainbow—yellow and red predominating. The yellow colour was due to light oils that had been present in the ammoniacal liquor, and which had distilled over and contaminated the salt in the saturator—such salt being decidedly oily to the touch. The acid used was quite free from arsenic. The cause of the red colour was rather more difficult to trace. It consisted largely of iron, though in what form was not determined. That iron was undoubtedly present, however, was proved by several qualitative tests as follows: Greenish-blue coloration with potassium ferrocyanide; immediate red coloration with only one drop of potassium sulphocyanide; brown precipitate of ferric-hydroxide with caustic potash; and black precipitate with ammonium sulphide. The red salt was found in almost every case attached to a piece of the blue, and on breaking was decidedly wet and "acidy." The iron probably exists as ferric oxide, due to some of the precipitated iron oxides becoming enclosed with the sulphate formed when the saturator acid was two weak.

While these tests point to the undesirability of allowing the acid in the saturator to become too weak, yet, on the other hand, this is not the only factor, as the amount of iron contained in the acid has also considerable bearing on the result. No trouble was experienced when the acid did not contain more than 10 grains of iron per gallon. The most suitable strength for the saturator acid is about 58° Twaddel. Above this, the salt contains free acid and is difficult to dry; while below that strength there is the risk of producing coloured sulphate.

AMERICAN AND CANADIAN PUMPING-ENGINES.

At the Meeting of the Institution of Mechanical Engineers on the 20th inst., a paper on "Water-Works Pumping-Engines in the United States and Canada" prepared by Mr. JOHN BARR, of Kilmarnock, was read by the Secretary.

The author began by stating that on the occasion of the recent summer meeting of the Institution in America, he availed himself of the many courtesies extended to the members by their hosts. He had therefore set down a few notes of his observations of typical water-works in America. These impressions had been summarized, and they were followed by brief descriptions of the pumping-engines in twelve stations, for particulars of which he was indebted to the various Engineers-in-Charge and others, to whom he expressed his acknowledgments. The pumping-stations described were the following: Schenectady, Cincinnati, Philadelphia, Pittsburg, Chicago, St. Louis, Desmoines, Minneapolis, Winnipeg, Toronto, London (Ontario), and Boston. The following are the author's deductions referred to: (1) The type of high-duty water-works pumping-engine in the United States is generally that of rotatory vertical triple-expansion, which is undoubtedly the most modern type, gives best duty, and seems to be the favourite. (2) The steam-valves are Corliss in the high-pressure cylinder, usually Corliss in the intermediate cylinders, and poppet in the low-pressure cylinder. (3) Piston speed is usually about 200 feet per minute, sometimes a little higher. (4) Duty under test-run varies from 140 to 160 millions of foot-pounds per 1000 lbs. of steam for engines having a daily capacity of from 10 to 15 million gallons of water pumped into mains against a pressure of about 100 lbs. per square inch. (5) Pumps work quite well and quietly with suction under a head of pressure; air-vessels of ample capacity and means for keeping them charged with air being provided. (6) Air-vessels of ample size are fitted on both the suction and the delivery pipes. It is a common practice to have an air-vessel on top of each delivery valve, the three air-vessels being equalized by a connecting-pipe. (7) Pump-valves are of the multiple type of rubber or vulcanite, backed by a brass or phosphor-bronze spring. Valves are about 4 inches in diameter, and are very frequently set in cages placed in a strong plate in the valve casing. (8) The centre crank-pin of large pumping-engines has one end in the square block carefully fitted into a slot in the web of the crank on one side, to allow "accommodation." (9) Journals are almost invariably lined with "Babbett" metal. (10) A heater is frequently inserted in the exhaust-pipe between the low-pressure cylinder and the condensers. The rise in temperature thus gained by the feed water cannot be great, but is considered worth getting. (11) Many of these large engines are splendid examples of mechanical engineering, being smooth working, efficient, and well-finished machines.

From the author's descriptions of the works he visited we take the following particulars.

Schenectady Water-Works.—At these works there are two triple-expansion vertical condensing "Deane" pumps, duplex, which lift about 20 million gallons of water per 24 hours, and seem to do good work. The new pumping plant recently put down consists of an electric motor, running horizontally, carried by girders at the ground level, and connected to a centrifugal pump underneath by a vertical shaft about 7 inches in diameter. The current is brought from Falls, about 20 miles away, at 10,000 volts. The motor is three-phase, the voltage being transformed down to some 550 volts, 800 amperes; and the speed of the motor and pump is about 800 revolutions per minute. The centrifugal pump is 6 feet in external diameter, and raises water from an adjoining well; the level being about 16 feet below the pump. The water is sent into mains against a pressure of 100 lbs. per square inch. There is also a small auxiliary electrically-driven geared vacuum pump to exhaust the main pump and suction-pipe from the well for charging purposes; also a set of small electrically-driven geared three-throw pumps, to pump oil at 100 lbs. per square inch under the upper collar-bearing of the motor on which the weight of the armature, shaft, and pump-disc all hang, so that the whole of the moving parts are floating on an oil step-bearing above. The pressure of the oil in the annular space between the two bearing discs just eases them apart and takes the whole weight (amounting to several tons) of the working parts. The water to be pumped amounts to 10 million (U.S.) gallons* per 24 hours, which works out to about 500 pump-horse-power.

Cincinnati Water-Works.—Messrs. R. D. Wood and Co., of Philadelphia, have under construction in their works four sets of 1000-horse power vertical triple-expansion jet-condensing pumping-engines for these works. They are 98 feet high; the low-pressure cylinder is 82 inches in diameter and 8 feet stroke; speed, 16 revolutions (256 feet per minute); two fly-wheels on each engine, 24 feet diameter; boiler-pressure, 160 lbs. The pumps have to force against 100 lbs. per square inch; and the duty has to be between 160 and 170 million foot-pounds per 1000 lbs. of steam. The air-pumps and feed-pumps are driven by the main engines. They are provided with vacuum-destroyer and drop-governor, and the weight is about 1500 tons per set. The suction and delivery valves of the large pumps have rubber discs backed by a brass spring of round section; and there are a large number of 3½-inch diameter valves.

Philadelphia Water-Works (New Pumping-Station).—There are three sets of vertical triple-expansion engines, with three ram-pumps, each set to pump 20 million U.S. gallons against 80 lbs. pressure per square inch. The low-pressure cylinders are 96 inches in diameter, and 5 ft. 6 in. stroke; Corliss valves; pump-rams, 33 inches diameter; valve-casings (pump) and specials all tested to 300 lbs. per square inch. A heater is interposed between the low-pressure cylinder and the jet-condenser, to heat the feed water. The air and feed pumps are driven by the main engine. Duty specified to be 160 million gallons per 100 lbs. of coal or 1000 lbs. of steam; boiler pressure, 160 lbs. per square inch. The crank-shafts are built of steel. The suction side of the pumps is under a head of about 20 feet. The pump-valves (multiple) are about 4½ inches in diameter, of the usual type, with rubber discs backed by a spring. Each pump-delivery chest has an air-vessel on top, kept charged by Westinghouse air-pumps. The air-vessel has a disc cast inside with hole about 14 inches in diameter, said to be for the purpose of preventing surging in the air-vessel. Each engine weighs about 1000 tons. The engine-house is a fine building, with 30-ton overhead electric crane, 80 feet span.

Pittsburg Water-Works.—All the three sets of pumping-engines at the Herron Hill sub-station were made by the Allis-Chalmers Company, of Milwaukee. With the two small sets the speed is 40 revolutions; two fly-wheels (four bearings), 2 ft. 6 in. stroke; Corliss valves, all having trip cut-off; steam, 150 lbs. The suction is under a head of 35 lbs., and the pumping against 80 lbs.; so that there is only 45 lbs. pressure on the pump. The engines work smoothly and quietly, and cannot be heard in the street 20 yards away. The cylinders are 20 inches, 36 inches, and 56 inches in diameter. The pumps have a delivery air-vessel above each set of delivery valves, and these three air-vessels are all equalized by a pipe 12 inches or so in diameter. The pump-valves are placed in a large disc about 4 feet in diameter, and are in cages. Feed water is passed through the upper portion of the tubes in the surface condenser, and goes into the boiler at about 120° Fahr. The boilers are fired with natural gas, which gives a beautiful blue flame and no smoke or ash. At the Brilliant pumping-station, the pumps draw water from the Alleghany River, which at times is very thick and muddy. The unfiltered water is full of slime, but filters are about to be made on flats across the river, to which two steel pipes 5 feet in diameter will be laid. The engine-house is a magnificent one. There are at least eight sets of very large vertical compound engines. The general features are similar to those of the other stations; but the latest set of large cross compound engines have cranks at 180° and single-acting plunger pumps, and they work beautifully and smoothly, having capacious air-vessels to take up the shock, and heavy fly-wheels—two to each engine. The pump-valve chambers and air-vessels above form supports and stiffeners for the main framing of the engine; but there is a plate 3 or 4 inches thick inserted at the top, so that any chamber can be removed by simply taking out this plate. There are two piston-rods in the steam-cylinders. The diameters of the cylinders of this latest set are 66 and 96 inches, by 64 inches stroke. The speed is about 200 feet per minute, or rather more; and the duty is about 140 million gallons.

Chicago Water-Works.—At the Fourteenth Street pumping-station there are three engines each of 15 million gallons, and one of 30 million gallons capacity—all of the vertical triple-expansion type. They are supported underneath by heavy brick pillars on one side. The large engine (30 million gallons per 24 hours) has

* United States gallon = ⅚ Imperial gallon.

plungers 42 inches in diameter and 5 feet stroke, Corliss valves, and two piston-rods to each steam cylinder. The engine has been two years at work, and during that period had averaged 23·7 hours per diem; so that it was very rarely at rest. Steam is supplied at 150 lbs. pressure; and the duty on the test was 155 million foot-pounds per 1000 lbs. of steam. The cylinders are about 32, 46, and 90 inches in diameter. All the engines worked quietly and effectively.

St. Louis Water-Works.—At Bissell's Point pumping-station, three sets of triple-expansion engines are being erected, each having a capacity of 20 million gallons per 24 hours, pumping to 100 lbs. per square inch, with suction under a pressure of about 15 feet head. The pumps are 33⅜ inches in diameter, with 6 feet stroke; the speed is 16½ revolutions (198 feet per minute). The duty is about 160 million foot-pounds of water lifted per 1000 lbs. of dry steam. There is no superheating; steam is supplied at 140 lbs. per square inch. The weight of each fly-wheel is 40 tons. There are four main bearings and one tail bearing. The engines work very quietly and smoothly. It may be interesting to add that there are three pumping-stations for the St. Louis Water-Works: (1) At the Chain Rocks, up the river above the city; (2) at Baden, for the high levels; and (3) at Bissell's Point, for the lower districts. At Chain Rocks the water is taken from the river and pumped into settling-basins covering an area of more than 40 acres. There are four triple-expansion engines here, each capable of delivering into the basins 30 million gallons of water daily. Two duplex pumps are kept for emergencies, and only used when the large engines are stopped. The water in the settling-basins is allowed to purify itself by settling for from 24 to 30 hours; and it is then carried into the conduit to the two high-service pumping-stations, from which it is delivered into the city mains. The four engines at Chain Rocks have each three 48-inch plungers. The engines stand 70 feet high, and weigh nearly 600 tons each. At the Baden high-level pumping-station there are six engines pumping against 140 lbs. per square inch—two delivering 10 million gallons each, and four 15 millions each. At Bissell's Point station there are, besides the three engines described above, three old beam and fly-wheel engines still at work occasionally as a stand-by; but they consume much more steam per horse power than the more modern engines.

Desmoines Water-Works.—There are three engines—two Holly horizontal compound rotatory condensing and one Worthington horizontal. The latest Holly is a double cross compound, with the high-pressure and low-pressure cylinders superposed horizontally (two of each). The following are details: Cylinders, 24 inches and 42 inches in diameter by 36 inches stroke (144 feet per minute); contract speed, 24 revolutions per minute; Corliss valves; air-vessels have an air-pump to charge them; fly-wheels are in two halves; pumps with multiple valves of the usual type; suction, 17 feet depth; steam, 122 lbs.; water, 102 lbs.; duty about 125 million gallons per 1000 lbs. of steam. The machines are compact, but parts of them appear to be rather inaccessible for repairs. The water supply for Desmoines is taken from the Racoon River, or rather it is pumped from the sand and gravel bed about 16 feet underneath the river. The tunnels or headings, 5 feet by 4 feet, consist of wood frames having open sides and bottom, and are about 4000 feet long (closed top). A tunnel or gallery brings the water into the well, from which it is pumped. The water is clear, cool, and naturally filtered. The remarkable thing about this underground supply is that there seems to be a river under the Racoon River—the submerged stream being in a gravel bed; and this lower river flows as does the upper one. Consequently, it is proposed to construct a dam under the river-bed down to the lower strata (which is clay), so as to dam back the water, and give underground storage in dry seasons. At times the Racoon River is almost dry, and then the underground river gets short also.

Minneapolis Water-Works.—At the old pumping-station is a Worthington high-duty compound engine. Its pressure is 214 feet; duty about 80 millions. At the new pumping-station, on the other side of the Mississippi River, there have just been erected and set to work two sets of Holly vertical triple-expansion surface-condensing pumping-engines. The cylinders are 30, 56½, and 84 inches in diameter and 60 inches stroke; the speed is 20 revolutions, equal to 200 feet per minute; and the suction lift about 16 feet. The engines pump against a pressure of 214 feet. The capacity of each engine is 15 million gallons per 24 hours, and the guaranteed duty is 140 million foot-pounds per 1000 lbs. of steam; but it is hoped that better results will be obtained. There are three plunger-pumps, each 29¼ inches in diameter; and the pump-valves are of the usual multiple type. Each engine complete weighs about 750 tons; each fly-wheel, 30 tons; and there are two wheels on each engine. The engines work very smoothly and quietly.

Winnipeg Water-Works.—At these works there are two sets of pumping-engines, of a capacity of 8 million gallons. One engine is a compound vertical Worthington, and the other a triple engine. The latter has six cylinders and two pumps; the cylinders being 18, 27, and 40 inches in diameter and 2 feet stroke, but working only at 18 inches stroke. The pumps are 24-inch, and work at 40 lbs. per square inch. They are double plunger and outside packed, and have a balancing ram against 90 lbs. per square inch to balance the working parts. The duty of the engine is said to be 80 million gallons; and it works very quietly. The water is very hard, and is softened by Clark's process. It is pumped from a well about 12 feet under the surface to a tower, by a separate pumping-engine; and it gravitates from the tower through a filtering press, &c., and runs into a clear-water tank (softened), whence it is picked up by the main pumps. The softening is said to cost 3c. per 1000 gallons; but the softened water is clear as crystal, and the hardness is stated to be reduced from 50° to about 7°.

Toronto Water-Works.—The older engines at these works are one of 8 million gallons and one of 5 million gallons capacity, cross compound duplex Worthington. They are about 20 years old. The steam pressure is 60 lbs.; water pressure, 90 lbs.; pumps double-acting (in sleeve), 24 inches in diameter and 3 feet stroke. The duty is about 40 million gallons. The two newest engines are Holly horizontal cross compound rotatory, with cylinders 28 and 56 inches in diameter and 4 feet stroke, working at 32 revolutions, which is equal to 256 feet per minute; but they often run up to 300 feet per minute. The duty is about 100 million gallons. They are like the Desmoines engine. They are at present making foundations for a new triple surface-condensing engine, with a piston speed of 200 feet per minute to pump against 100 lbs. pressure per square inch; the duty specified being 165 million gallons per 1000 lbs. of "commercially dry" steam. The steam pressure will be 150 lbs. per square inch; and the capacity, 15 million Imperial gallons per 24 hours.

London (Ontario) Water-Works.—The supply to these works is from beautiful springs—pure, clear, hard water—and is pumped to the reservoir against 105 lbs. pressure by two sets of horizontal double-acting pumps, 18½ inches in diameter and 2 feet stroke, working at 24 revolutions. There are two pumps in each set—four pumps in all. They are driven by two turbines which get water power from a weir on the river, 10 feet fall (about 150-horse power). They have also two sets of horizontal compound (cross) pumping-engines as a stand-by when water power fails.

Boston Water-Works.—Owing to want of time, the author was unable to see at work the engines at the Chestnut Hill pumping-station. They are, he understands, among the best examples of pumping-engines in the United States. Their capacity is 30 million U.S. gallons per 24 hours. The diameters of the cylinders are 30, 56, and 87 inches, and the stroke is 66 inches. The duty is 178,497,000 foot pounds per 1000 lbs. of dry steam. The thermal efficiency of the engine is 21·63 per cent.

In a few general remarks with which the author closed his paper, he said that in Great Britain the duty of pumping-engines is usually expressed in foot-pounds of water lifted per 12 lbs. of best Welsh coal. In the United States and Canada this duty is given as per 1000 lbs. of dry steam. In the United States, the gallon employed is the United States gallon, equal to five-sixths of the Imperial gallon; in Canada, the latter seems to be usually employed.

WATER FILTRATION AT PHILADELPHIA.

In a recent issue of the "JOURNAL," we reproduced the testimony borne by Sir William Crookes and Sir James Dewar to the value of storage and filtration in ensuring the excellent quality of the water supplied to the Metropolis. That the importance of efficient filtration is recognized by the authorities of Philadelphia is evident from the following particulars of the works, which were furnished by Mr. John W. Hill in an address delivered to the Union League Club of that city, and published in the "Engineering Record," which has at various times described the works in some detail.

The original capacity of the Torresdale filters was 248 million gallons per day, and sufficient land was taken to increase the capacity of this station, if need be, by 200 million gallons more. Thus the works as outlined, without anticipating any changes or additions to Roxborough, will have an ultimate total capacity of 577 million gallons, or more than the amount provided by the new works proposed for the cities of New York and London, in each of which cases the maximum capacity thus far discussed in speculating upon the future requirement is limited to 500 million gallons per day.

The lower Roxborough station draws its water from the old Roxborough reservoir, which has a capacity of about 13 milion gallons, and represents about one day's supply when the filters are worked at the rate of 12 million gallons per day. This station is provided with a system of preliminary filters; and when the works are operating at 12 million gallons per day, the final filters will be run at the rate of 6 millions per acre per day. In order to demonstrate conclusively the ability of the Bureau to operate the filters at this rate, one or more of them are maintained at or near it at all times, notwithstanding that the quantity of water drawn from the station at present is not up to its capacity.

The upper Roxborough station draws its water from the new Roxborough reservoirs, from which it is lifted by low-service pumping machinery, located in the annex to the Roxborough auxiliary pumping-station, to the filters. These works have an easy capacity of 20 million gallons per day. But, owing to lack of pumping facilities, it is not possible to run either the upper or lower Roxborough works at their rated capacity; and thus, instead of furnishing 32 million gallons per day at the present time, only 17 millions are supplied.

The Belmont filters, without the preliminary filters, have a capacity of 33½ million gallons; but with the addition of preliminary filters, one installation of which is now under construction, the capacity of the present system of plain sand filters will be raised to 65 million gallons per day. When it may become necessary to increase the capacity of the station beyond the latter amount it can be done, as sufficient land was taken upon which to build eight additional plain sand filters, each of ¾ acre area. Then with the further addition of 30 million gallons of preliminary filter capacity, the Belmont works can easily supply 95 million gallons per day.

The Torresdale filters have been located with regard to the possible introduction of water from impounding sources of water supply on the Delaware, Lehigh, Tohickon, and Neshaminy watersheds, should conditions in the future suggest the advisability of abandoning the intake at the Torresdale filters, and drawing the water from very large storage basins located on the watersheds mentioned. The elevation of these basins would be such as to deliver the water by gravity to the Torresdale filters. If the physical conditions of the source or the sentiment of the people in the distant future should demand a change of the source from which the raw water is drawn, no portion of the Torresdale filtration works would be lost, excepting the pumping machinery and station for the lifting of the raw water from the Delaware River to the preliminary filters. Even if the water was drawn through long aqueducts from these distant sources, it is a question whether it would not be advisable to always maintain ready for working the low-service pumping machinery at Torresdale, in case of accident to the aqueduct or depletion of the storage sources of supply. From this point of view, no portion of the work that is now being carried out under the general title of the Torresdale filters would be abandoned, even should the water in the future be drawn from some distant point.

An interesting feature with reference to reservoirs and tanks forming a part of filtration works has been the attempt to secure as nearly as possible water-tightness. Realizing that a filter tank 200 feet long by 135 or 140 feet wide, carrying water for a depth of 9 feet, could not be as tight as a glass bottle, a standard of leakage was fixed to which the filters were required to comply. This was 1000 gallons per day for a ¾-acre filter; and the leakage test was carried through a period of at least fourteen consecutive days, during which time careful gaugings were made of the loss of water in the filter, with proper corrections for weather changes. Of the 55 filters in the first installation at Torresdale, 19 showed an average loss in 24 hours of 244 gallons per day; 15 filters, an average loss of 488 gallons; 14 filters, 732 gallons; and 2 filters, 967 gallons; while 5 filters showed no loss whatever—*i.e.*, the leakage, if any, was so small that it could not be measured with delicate hook gauges. The average leakage for all the filters was 439·2 gallons in 24 hours, or less than half of what was regarded as a fairly allowable leakage for structures containing many thousand lineal feet of mortar joints, and depending almost entirely upon a 12-inch thickness of puddle for water-tightness in the bottom.

In considering the total cost of the improvement, extension, and filtration of the water supply, which Mr. Hill estimates at $26,100,000, it should be borne in mind that a very considerable portion of the expense—more than one-third—is represented by improvements not essentially a part of the filtration works. Some of these, of course, are made necessary by reason of the construction of the filters in the localities chosen; but much of the expense charged to ordinary betterments would have been required in order to maintain a supply of water to the city entirely apart from the works constructed for the purification of water. A considerable portion of the outlay is chargeable to the very large daily consumption per head—viz., 229 gallons. It is fair to state, Mr. Hill said, that if the consumption per head was no greater than that of cities like New York, Brooklyn, and Milwaukee, the cost of the works for Philadelphia would be largely reduced; and this fact should be borne in mind in comparing the total cost of the works with the total costs elsewhere.

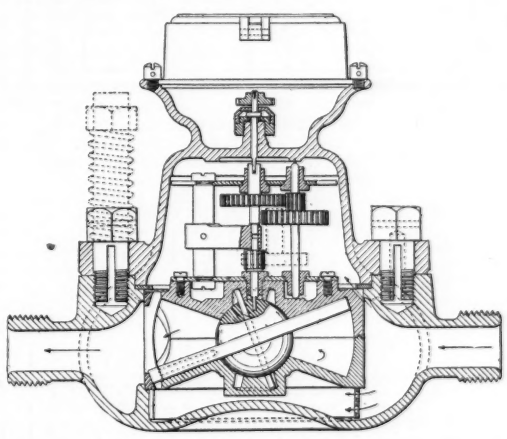
To illustrate the working of the filters, Mr. Hill mentioned the results obtained during the week ending Nov. 12, 1904. The average of the effluents of all the filters at the lower Roxborough station for the week contained but 8 bacteria per cubic centimetre, against 15,000 in the river water at Shawmont; and 0·5 part turbidity per million by the silica standard, against 13 parts in the raw water. At the upper Roxborough station, the average of all the effluents of the filters was 20 bacteria per cubic centimetre and 0·5 part turbidity, with the same condition of the raw water as it left the river for the lower Roxborough reservoir. The Schuylkill River at the Belmont pumping-station contained 9600 bacteria per cubic centimetre. When it left the new sedimentation reservoirs forming part of the Belmont works, it contained 3100 bacteria; and the average of the effluents of all the filters was 16 bacteria per cubic centimetre, with the same turbidity as shown for the Roxborough filters. The standard of filtered water in England and Germany is 100 bacteria per cubic centimetre, and any water filtered within this limitation is held to be fit for use for drinking and other domestic purposes. In the early discussion on the subject of the filtration works for Philadelphia, it was thought that the bacterial contents of the filter effluents could be reduced to 60 per cubic centimetre. As a matter of fact, with the filters now in operation, it is rare indeed that the bacterial content is as high as 60; and throughout the year it will average less than this number.

It has been held in a number of instances that the crucial test of merit of an improved water supply will be shown in the reduction in the number of typhoid fever cases. Of course, so long as only portions of the city are receiving filtered water, this test cannot be applied in a broad way. However, so far as it was possible to do so, a very careful investigation was made during the past year of the typhoid fever rates in parts of the city which received water from the upper and lower Roxborough filters, and a portion of West Philadelphia which received only filtered water. When compared with the remainder of the city, considering Roxborough for a period of 46 weeks, ending Nov. 18, the typhoid fever reduction in the part served from the filters there was 55·6 per cent.; when compared with West Philadelphia, 75·4 per cent.; and when compared with portions receiving water from the Delaware River, 59·5 per cent. The filtered water section of West Philadelphia represents about one third of the total population of that district. For a period of 24 weeks, from June 3 to Nov. 11, there were 15 cases of typhoid fever reported for the filtered water section, against 240 cases reported for the mixed water section; and assuming the population of the latter to be twice that of the former, there were then 15 cases in the filtered water section, against 120 cases in the mixed water section—showing a reduction of 88 per cent. in the typhoid fever rates. It is confidently believed that when the entire water supply is filtered the reduction in the typhoid fever rate will be 80 per cent. It is not thought that water from any natural source could probably make any better showing than this, because some of the remaining 20 per cent. of typhoid cases must be attributed to the drinking of water outside the limits of Philadelphia, as well as to sources of infection other than water.

REGISTER OF PATENTS.

Disc Water-Meters. — Thomson, J., of New York. No. 21,291; Oct. 4, 1904.

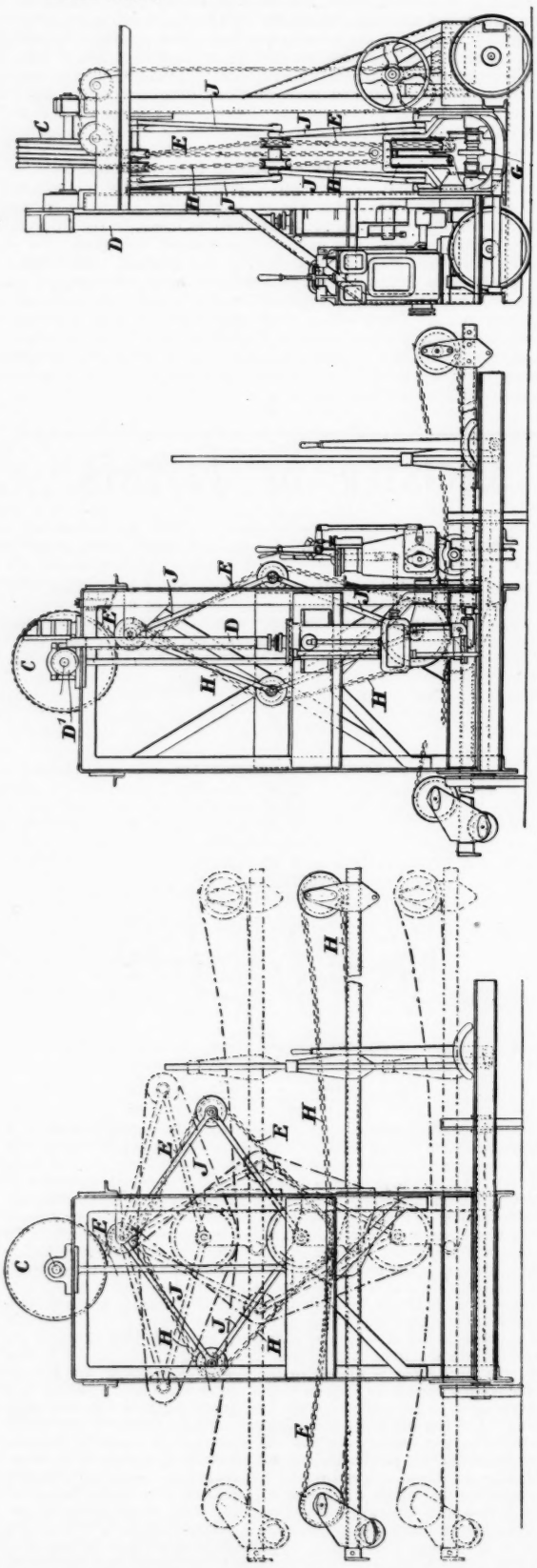
This invention, relating to disc water-meters, has for its object "to increase the sensibility of registration at low rates of flow, to increase the endurance when operated at high rates of delivery, to minimize the damage, expense, and inconvenience should the meter be frozen, and (in general) to reduce the cost of construction and yet increase the life and effectiveness of this type of meter."



The main casings and the disc-casing are (as shown) so disposed and constructed as to reduce liability to injury in the event of freezing. In this connection, reference is made to prior patents No. 10,022 of 1894 and No. 1134 of 1898, which cover, broadly, a design of meter in which, when an enclosing head, at the bottom, is blown out by the expansive action of freezing, the inner measuring-case shall be free to follow the head, and also to separate in two parts, horizontally. In this wise, the moving column of ice within the main casing, acting against the top of the meter as an abutment, will not disrupt or distort the more delicate and accurately formed measuring-chamber. It is to be noted that, in the patents cited, the enclosing head is at the bottom directly underneath, and in close proximity to, the measuring-chamber —the consequence of which is that these parts are located where the travel of the ice-column is greatest. According to the present invention, the disc-casing is placed in the lower main casing, and it is secured against its seat by the rim of the upper main casing, which acts directly upon an interposed gasket, and in so designing the two main casings that the depth of each shall be approximately equal to the other. The two casings are then secured to each other by bolts or nuts, arranged by predetermined experiments to break, strip, automatically withdraw, or yield resiliently, under a pressure considerably greater than that which the meter will ordinarily be subjected to, but well within the strength of the casings. The consequence of this arrangement and disposal is that the ice will be caused to flow in two directions—that is, from the top downwardly to the line of separation of the main casings, and from the bottom up to the same line of separation. Thus, the two main casings will be forced apart; the contained disc-chamber casing will be lifted from its seat; and its two sections will be separated at their horizontal snap-joint. Therefore, when the bolts

yield, the result is that the disc-casing is caused to move upwardly and to an extent equal only to that of the expansion of the ice in the lower main casing. It is thus less liable to be cramped in its bearing, and can be more easily and surely reset to its normal position.

Discharging Gas-Retorts.—West, J., of Southport. No. 5722; March 1, 1904.



This invention relates to a method of adjusting the chains which communicate power for giving reciprocating motion to the rake or discharging ram of a machine for discharging gas-retorts.

The type of machine to which the invention applies is one fitted with a driving shaft supported in bearings fixed on the top part of the machine framework; this driving shaft having a grooved chain-drum keyed or fitted to it, so that both revolve together when motion is imparted by suitable driving gear. Two separate chains are attached to the chain drum—one leading off one side of the drum, and one off the other side. Thus, when the drum is revolved in one direction, one chain winds on to the drum and one chain winds off; and when the direction of the revolution of the drum is reversed, the chain which was previously unwound is wound on and the other chain is unwound.

The application of the system referred to is shown as applied to a retort-discharging machine—in side and end view; also a side view showing three positions of the discharging rake or ram, which has to be adjusted to the heights of the retorts. This latter view also shows the collapsible parallelogram-shaped frame along the sides of which the driving chains from the main driving drum are led to the ends of the rake bar or ram.

Three tiers of retorts are shown, to which the rake-bar or discharging ram frame B has to be adjusted when it is placed in position opposite the retort to be discharged. C is a chain drum fixed to a driving shaft revolved in alternate directions by the rack and pinion D and D^1 put into motion by a cylinder or other motor. E is a chain, one end of which is fastened to the drum C, and passes over pulleys and then attached to the end of the ram or rake-bar G, which is supported in the frame B. The chain, when in tension, sends the ram or rake head into the retort. H is a chain fastened to the drum C, and passing over pulleys and then attached to the end of the ram or rake-bar G. This chain, when in tension, withdraws the ram or rake head out of the retort. The chains E and H are alternately in tension according to the direction in which the drum C is rotated.

The chain pulleys are supported by a parallelogram-shaped frame with parallel sides J, which are jointed so that the frame may be collapsed or extended to any position to accommodate themselves to the height of the rake bar or ram frame. Thus, whether this is at its lowest or highest position, the chains E and H do not require to be altered in their length, as the frame J, being closed up when the rake or ram is in position for the top retorts and opened out when in position for the bottom retorts, accommodates the chain to the several positions.

Prepayment Gas-Meters.—Wilson, G., of 's-Gravenhage, Holland. No. 16,900; Aug. 2, 1904.

This prepayment mechanism for gas-meters has for its object to provide that the various parts are not exposed to the action of the gas, and in which the quantity of gas allowed to pass through the meter for a coin of given value can be varied without breaking the seal of the meter. Means are also provided for restricting the number of coins admitted to the apparatus at one payment.

As shown (p. 365), the main casing has a slot A for the insertion of the operating coin. It encloses the valve-actuating mechanism, and a gas-tight casing B for isolating the gas-passage and valve from the mechanism. This is removably secured to the main casing in a suitable position with relation to the valve-operating mechanism therein. Immediately beneath the coin-slot in the main casing, a barrel C, slotted to receive the operating coin, is mounted so as to be capable of being rotated by a handle outside the casing. The movement of the coin-barrel is restricted by two projections on the wall of the main casing which engage a lug projecting from the barrel or its handle. The coin is prevented from passing through the slot by reducing the length of the latter, or by shoulders formed therein at a part remote from the slot in the casing when the barrel is in its receptive position. Parallel to the coin-barrel there is fitted a shaft D, capable of longitudinal movement and carrying a loosely-mounted star-wheel E, controlled by a spring in such a position as to be readily operated upon by a projecting coin in the barrel when the latter is rotated. At the back of the star-wheel a snail or cam is fixed to, or formed in one with, its boss, for the purpose of acting upon a projection fixed to the shaft and causing it to move longitudinally backwards to actuate the gas-valve.

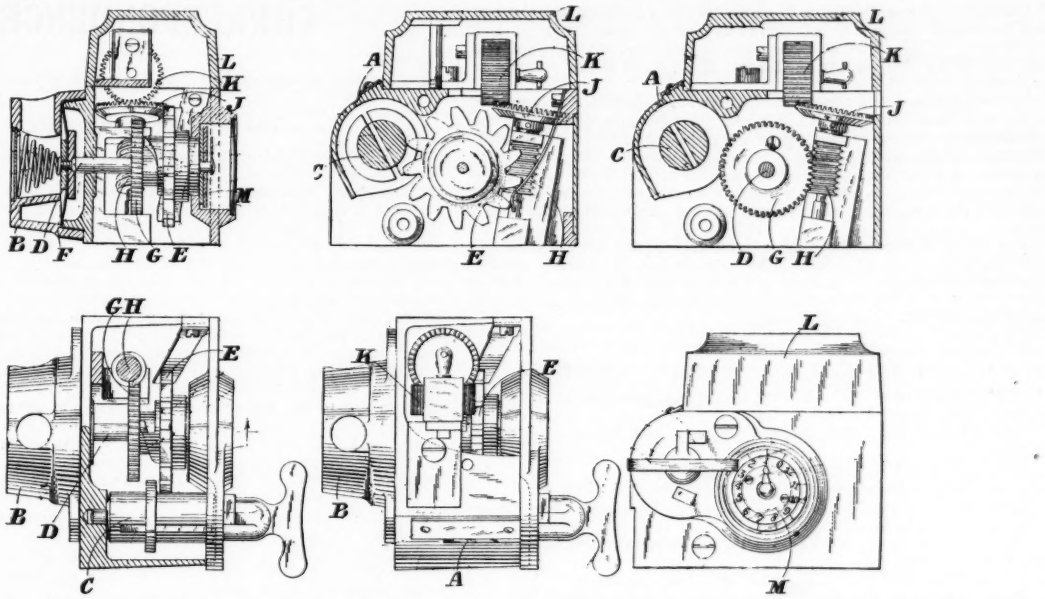
The gas-valve—of diaphragm type—is enclosed in the gas-tight casing B, and is provided with inlet and outlet ports, and formed so that the gas must pass over the face of the diaphragm F before it reaches the outlet; the gas never gaining access to the back of the diaphragm—that is to say, to the coin-operated mechanism.

A worm-wheel G is fixed to the shaft D, and is rotated by counter mechanism comprising a worm H mounted at right angles to the shaft in bearings fixed to the inner face of the main casing, a crown-wheel J mounted upon its spindle, and a counter-wheel K mounted on a short shaft supported in bearings and provided with ready means for connecting it to a rotating spindle or shaft or other working part of a meter. The number of teeth in the wheel governs the quantity of gas supplied for a specified coin. It is so arranged that it can be readily removed from the mechanism; this being effected by mounting the former in a yoke removably secured to a bracket on the casing. The main casing is provided with a removable extension L enclosing the counter mechanism and making the counter-wheel of the latter easily accessible.

The cam on the boss of the star-wheel E is formed with a catch or axial abutting face, which, after one complete revolution of the wheel—that is to say, when the predetermined number of coins has been paid into the apparatus at one time—engages the projection on the shaft D; and as the latter is incapable of rotation through the engagement of its worm-wheel G with the worm H, no further movement of the star-wheel is possible, and, consequently, more than the specified number of coins cannot be passed into the apparatus at one payment.

A graduated dial M, visible from outside the casing, is carried on the front side of the star-wheel E, and the front end of the longitudinally moving shaft D carries a pointer arranged at right angles to the shaft, so as to rotate in front of the dial.

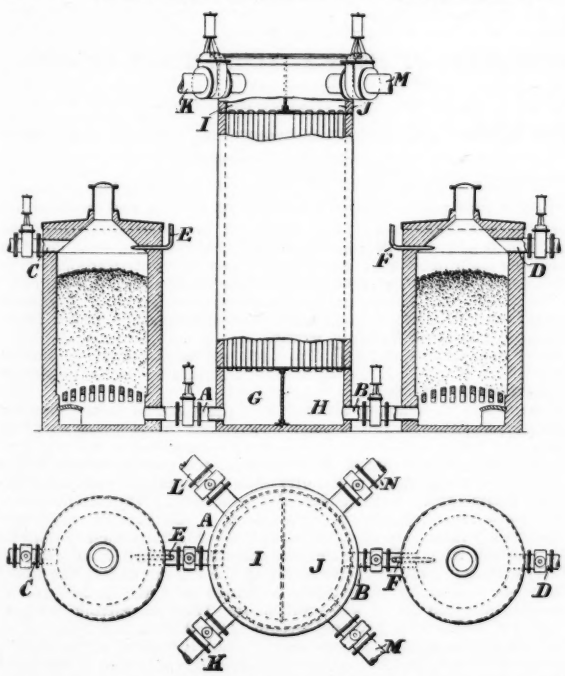
The appliance operates as follows: The handle of the coin-barrel C being turned to the correct position, and presuming the valve F to be closed, a coin is inserted at A and the handle turned half-a-revolution, whereby the star-wheel E is turned a distance equal to one tooth. This rotates the dial M one point, and causes the cam on the star-wheel to



move from the projection on the shaft D or worm-wheel G, and thus release the shaft. This allows the spring in the valve-chamber to move the diaphragm F forward and open the valve; and at the same time the shaft D is moved longitudinally forward in its bearings. Gas is now free to pass, and the meter mechanism operates the counter-wheel K, the rotation of which is communicated to the worm-wheel G by the crown-wheel J and worm H. This movement continues until the projection on the shaft or boss of the worm-wheel bears against the full part of the cam and the worm-wheel G and shaft D are moved longitudinally backward, the rear end of the latter actuates the diaphragm F and gradually shuts the valve again, when the mechanism and the supply of gas stops until another payment is made. It will thus be seen that the dial M rotates to indicate the number of coins inserted at each payment, and the pointer on the shaft rotates afterwards and indicates the quantity of gas still to be consumed before another payment is required.

Generators for Producing Water Gas and Generating Steam.—Neuman, F., of Aix-la-Chapelle. No. 21,318; Oct. 14, 1904. Date claimed under International Convention, Oct. 20, 1903.

This invention has for its object to combine a double gas-producer with a steam-boiler in such manner that "the latter is always uniformly heated, and consequently a uniform production of steam is insured."



The apparatus consists of two independent gas-producers, the lower parts of which are connected by pipes A and B to the steam-boiler between. In the pipes are provided slide-valves or other shutting-off devices. The producers are connected at their upper part to air-supply-pipes C D, and steam supply-pipes E F—all pipes being provided with suitable shutting-off devices. The discharge-pipes A B open respectively into chambers underneath the boiler, which are separated from each other by a partition. The chambers G H communicate with correspondingly arranged chambers I J at the top of the boiler by means of tubes passing through the water-space of the boiler. The top chambers are also entirely separated from each other by means of a partition, and are provided with gas discharge-pipes furnished with shut-off slides or equivalent means. Of these pipes, K M lead to the holder for the producer gas, while the pipes L N lead to the holder for water gas.

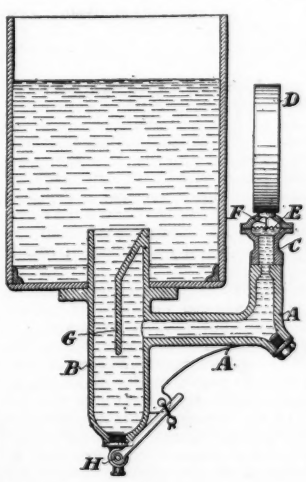
In the first instance, the left-hand producer (say) is worked for the generation of producer gas, for which purpose air is forced in through the pipe C connected with a blowing-engine or the like. The gas thus produced passes through the pipe A (whose slide is opened) into the chamber G, passes through the steam-boiler into the chamber I, and passes from this through the pipe K (whose slide is open to the producer-gas holder), the slide of the pipe L leading to the water-gas holder being closed. After shutting off the air blast by closing the valve of the pipe C, water gas is generated in this producer by the introduction of steam by the closable pipe E, which gas also passes through the open pipe A into the chamber G, passing thence through the boiler into the chamber I, whence it passes through the pipe L into the water-gas holder.

During the water-gas production period of the producer first worked, producer gas is generated in the other producer by the introduction of air through the pipe D, which gas passes through a pipe B into the chamber H, whence it passes through some of the pipes of the boiler at the same time that the water gas is passing through other of the pipes from the chamber G, and passes into the chamber J, separate from the water gas passing into the chamber I. From the chamber J the producer gas passes through the pipe M to the producer-gas holder.

After a given time, the action of the producers is again reversed, the first producer being made to generate producer gas, while the other generates water gas. The two kinds of gas, without coming in contact with each other, pass respectively into the chambers G H, and after simultaneously giving off their heat to the boiler issue from chambers I J separately to the corresponding holders.

Liquid Meter.—Hillner, T., of Bucharest, Roumania. No. 22,237; Oct. 15, 1904.

The patentee remarks that devices heretofore made for measuring quantities of liquid, in which the reservoir containing the liquid is connected with a manometer for measuring the liquid pressure, suffer from the drawback that the membrane or spring of the manometer is actuated by a column of air or gas between the liquid and the manometer spring. As the pressure of this column of air varies according to the position of the fluid in the reservoir, such measuring vessels have no constant zero point, and therefore are not sufficiently exact. But under the present invention, the liquid to be measured is caused to act directly on the membrane or spring of the manometer, and the spring or membrane is arranged at such a level as to be above the base of the reservoir. In this way, "the zero point is obtained for measuring at a constant level above the base of the reservoir, and is not affected by irregularities in the form of the base."



The reservoir shown has a its base a cylindrical vessel open at the top, which has a branch-pipe

A leading off perpendicular to it about half-way between the top and the bottom of the vessel B. Connected to the branch-pipe A is a union-piece C, joined to the manometer D, provided with any suitable mechanism for the present apparatus, and placed either vertical or horizontal.

In the form shown, a membrane manometer is provided arranged in a vertical position, in which the liquid pressure acts directly on the membrane E and is transmitted to the rod F actuating the indicator-spindle. When the manometer scale is marked in kilogrammes or grammes, it gives the weight of the column of liquid per unit area—for instance, for one square centimetre of surface of the main reservoir—so that the weight of the liquid can be read off directly on the manometer.

The vessel B is provided with a sand-trap G, and with a cock H; and the latter is provided with a lead-seal to furnish security against unauthorized opening. Preferably the upper end of the vessel projects above the level of the base of the main reservoir, so as to prevent the entry of scum and particles of mud.

APPLICATIONS FOR LETTERS PATENT.

1260.—PEARSON, J. S., "Mixing and using gases for heating purposes." Jan. 23.
1280.—LUCAS, P., "Incandescent gas-lamps with forced air supply." Jan. 23.
1288.—DREES, M., "Gas-purifier." Jan. 23.
1289.—WINDMÜLLER, S., "Acetylene generators." Jan. 23.
1306-7.—DANIELS, J. S., and T. H. & J. DANIELS, LTD., "Gas-producers." Jan. 23.
1320.—BEINS, J. F., and VIS, J. P., "Inverted incandescent burners and lamps." Jan. 23.
1361.—WILLIAMS, J., "Gas, coke, and steam producer." Jan. 24.
1394.—BRETT, C. G., and HENNEBERGER, F., "Burners," Jan. 24.
1422.—LEWES, V. B., "Heat-radiating bodies for use in gas-fires." Jan. 24.
1434.—BUEB, W., "Water-gas generators." Jan. 24.
1460.—ROSE, A., and BELLAMY, W., "Incandescent burners." Jan. 25.
1476.—HAYES, F. R., "Acetylene generators." Jan. 25.
1497.—ATKINSON, T. N., and ALDERTON, J. M., "Incandescent burners." Jan. 25.
1523.—THOMPSON, W. P., "Gas-engines." A communication from the Free Piston Gas-Engine Company. Jan. 25.
1529.—SAMPLE, H., "Gas-taps." Jan. 26.
1541.—BEALE, F., "Retort-lid fasteners." Jan. 26.
1544.—WHITE, W. L., and MOFFAT, W. & J. J., "Wall brackets." Jan. 26.
1559.—COLBRAN, J. B., "Gas-lamps." Jan. 26.
1576.—SPENCER, W., "Purifier grids." Jan. 26.
1578.—ROOKS, B. W., and ROBERTS, S. J., "Incandescent burners." Jan. 26.
1587.—MARCONNET, G., "Producing gas from pulverulent fuel." Jan. 26.
1631.—STOTT, J., "Bunsen burners." Jan. 27.
1656.—TCHERNIAC, J., "Production of sulphocyanides from crude coal gas." Jan. 27.
1671.—KELLY, T. D., and BILLINGTON, W. J., "Mantles." Jan. 27.
1679.—ARMSTRONG, J., "Manufacture of coke and gas." Jan. 27.
1696.—WHITFIELD, C., "Suction gas-producer." Jan. 28.
1702.—BELLOW, E. A., "Switching gas-burners on and off from any required position." Jan. 28.
1717.—BARNETT, M. C., and FIELD, A. E., "Gas-cookers." Jan. 28.
1734.—MULREADY, M. F. M. & E. M., "Gas-engines." Jan. 28.

Expenses of Councillors Attending Congresses.—The Local Government Board Auditor has disallowed expenses incurred by the Tottenham District Council in sending deputations to the congresses of the Sanitary Institute and the Institute of Public Health.

London County Council Electric Lighting Loans.—In a volume recording the work of the various Committees of the London County Council for 1903-4, a schedule of loans granted to London Local Authorities by the Council for the period 1889-90 to 1903-4 inclusive for electric lighting (including meters and street lighting) is given. The total number of loans is 216, and the aggregate amount £3,278,749. The largest sum (£577,998) was granted in 1901-2; the smallest (£38,700) in 1894-5.

Another Electric Light Failure in Liverpool.—The advisability of retaining a supply of gas in buildings lighted by electricity was clearly proved at a recent concert of the old Societa Armonica, in the small hall of St. George's Hall, Liverpool. A clever local violoncellist was in the midst of a solo when the fuse connected with the chandelier gave out, and, with the exception of a small gas-jet with which the chandelier was fortunately equipped, and some other lights at the rear of the platform, the room was thrown into darkness. Gas evidently saved the situation, as there was no interruption to the music. The gas equipment has been attached to the chandelier since the calamity at Chicago; and it has proved a very wise precaution.

Extensions at the Beccles Gas-Works.—At the quarterly meeting of the Directors of the Beccles Gas Company last Thursday, the report presented by the Manager (Mr. W. Methven) showed an increase of 11·8 per cent. in the sales of gas, compared with the corresponding quarter of the preceding year. In view of the large increase on the two previous quarters, and on the fact that the whole of the plant was at work at Christmas time, the Manager urged the necessity of the following extensions—viz., two beds of six retorts on the regenerative system, a scrubber, and a solid-plate saturator. The report was adopted, and Mr. Methven was directed to prepare estimates and advertise for tenders. We may add that at the last meeting of the Company the Manager's salary was raised £20 per annum, and the Directors expressed satisfaction at the Company's progress.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Naphthalene Question.

SIR,—Having read with interest the several articles and letters which have appeared in the "JOURNAL" during the past few months relating to the naphthalene remedy, I would like to state the results we have obtained from washing the gas with an absorbent for naphthalene. Four years ago, we first started to use anthracene oil containing 5 per cent. of benzol in four sections of a Klönne washer, each section containing 400 gallons of anthracene oil. A new charge of 400 gallons of oil was put into the top section of the washer every second day, and the remaining sections drawn down; thus leaving the charge eight days in the washer. By volume, we were able to load the oil with 35 per cent. of naphthalene; the oil as it came to us containing from 10 to 12 per cent. of naphthalene by volume.

After working intermittently for one-and-a-half years, we found the cost of anthracene oil too expensive. As we did not wish to give up the washing of the gas with an absorbent for naphthalene, we made some laboratory experiments with water-gas tar, freed from water, and found we had at hand in the works an absorbent equal to the anthracene oil. We immediately put the water-gas tar in use, and have been using it in the Klönne washer the same as we did the anthracene oil, with the one exception that we put on a new section of 400 gallons every day—drawing off the lower section, which passes into the coal-tar well. Using the tar as we do, we have been able to remove the naphthalene from 25,000 cubic feet of coal gas with one gallon of water-gas tar; the tar containing from 25 to 30 per cent. of naphthalene when taken out of the washer.

We have used the apparatus designed by Dr. Colman to make our tests; and we have found the gas free from naphthalene at the outlet of the washer, inlet to the station meter, outlet of the holders, and points on street-mains. The first year we washed the gas with anthracene oil we did not experience much relief from naphthalene stoppages, as the washing was not continuous—only during the period of our greatest trouble. After we put the water-gas tar in use, we decided that, to obtain any benefit from the washing of the gas, we would first have to absorb the accumulated deposit of naphthalene in the street-mains. To obtain this result, our scheme was to work the washer continuously, and thus send into the mains a gas freed from naphthalene which would be able to work upon the deposits there. Our experience has proved that we were correct in our deduction, as we were free from stoppages the first year in the district around the works; while the second year the stoppages were mostly from points on the outlying mains. Our experience has proven to us that water-gas tar as an absorbent for naphthalene, if kept in use continuously and the tar changed before becoming saturated, will remedy the naphthalene evil.

HOWARD E. MANN.

Works No. 2, Cleveland (U.S.A.) Gaslight Company,
Jan. 19, 1905.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

(*Before Mr. Justice* DARLING *and a Special Jury.*)

Ocean Accident and Guarantee Corporation, Limited, and Others v. Ilford Gas Company.

This action, which commenced on the afternoon of the 1st inst., and continued during the whole of Thursday and Friday, and on Saturday morning, was of the same nature as that of *Benning v. Ilford Gas Company*, which was tried before Mr. Justice Grantham in April last,* in which the plaintiff claimed damages for injury to property adjoining the defendants' works, caused by the flood which occurred on June 15, 1903. In the present case the plaintiffs claimed as mortgagees in possession of 209 houses in roads adjoining the Romford Road, at Manor Park, Ilford, close to the defendants' works.

Mr. SHEARMAN, K.C., and Mr. LECK appeared for the plaintiffs; Mr. LAWSON WALTON, K.C., Mr. DUKE, K.C., and Mr. SYLVAIN MAYER represented the defendants.

The amount of damages claimed was £460 loss of rent, £1700 for repairs, and £6800 for depreciation in value of the property—making a total of £8960; but it was stated at the outset that it was not proposed to go into any matter of amount on the present occasion, but simply to try the question of liability—the damages to be assessed afterwards, if the verdict went against the defendants. On this occasion, the Jury were assisted by a large model of the *locus in quo*, which enabled the evidence to be followed with much greater facility than on the previous trial. This model showed the Romford Road running nearly east and west, and crossing it at the eastern end of the model the River Roding, passing under a bridge of three arches (Ilford Bridge), and then on its way south to the Thames, skirting the gas-works, just below which the old stream of the Aldersbrook rejoined it. This stream passed through the works, which it entered at the western corner, under a bridge of two arches, about 100 yards west of the Ilford Bridge, having for some distance before reaching this spot skirted the north side of the Romford High Road. A little distance to the north of the road, and of the old stream of the Aldersbrook, the Great Eastern Railway Company had a considerable siding, which was raised some distance above the surrounding ground. The Aldersbrook in its course southwards skirted these sidings; and, for their own

* See "JOURNAL," Vol. LXXXVI., p. 247.

purposes the Railway Company diverted the stream at the south-west corner of their embankment, and carried it in a straight line along the southern margin of the sidings, so as to rejoin the Roding a few yards above Ilford Bridge. Previous to this work being completed, which, according to the evidence, was in March, 1903, the new course of the stream turned south opposite to the two-arched bridge through which it originally ran, and then went along by the side of the high road to the Ilford Bridge; and it was along the channel thus made that the water, on the day in question, found its way up to the old bridge, passed under it on to the defendants' premises, and there accumulated until it flowed over the old river wall on the west side for about 120 yards a foot in depth, and having washed away a good deal of the soil, made a breach through which the water poured on to the property belonging to the plaintiffs, which lay immediately to the west and south-west.

The plaintiffs' case was that the defendants had caused the damage by closing the Aldersbrook on their premises, under the powers of an Act of Parliament, and that if this had not been done, the water which got into the upper part of the gas-works under the old arches would have run off down the old channel, and so into the Roding again lower down. It was also suggested, in the progress of the case, that they ought to have closed up the arches, and so prevented the water getting into their premises at all. With regard to this suggestion, some evidence was given to the effect that if it had been done the water would have risen right over the high road, and so got on to the plaintiffs' property.

The defendants' case was that the damage was caused directly by the partial blocking of Ilford Bridge by *débris* brought down by the flood, including a large piece of the fence erected by the Railway Company by the side of the new course of the Aldersbrook, and a 30-feet ladder, scaffolding, and a large quantity of timber from some new buildings which were being erected. This prevented the flood water getting through the bridge, and forced it back up the old channel, and on to defendants' premises. It was also contended, on the basis of calculations made by some of the engineers, that the quantity of water coming down on the night in question was so large that the channel of the Roding would not have had sufficient capacity to carry it all away when it met the incoming tide, and that, therefore, if the overflow had not taken place where it did, it must have occurred a little lower down, and done practically the same mischief.

The following witnesses were called on behalf of the plaintiffs: Mr. *A. H. Campbell*, the Engineer and Surveyor to the East Ham District Council; Mr. *Alwin*, the occupier of one of the flooded houses; Mr. *George Smith*, the Engineer in charge of the sewage-pumping station at Ilford; Mr. *H. Newman*, a foreman under the Ilford District Council; Mr. *H. Shaw*, the Surveyor to the Ilford District Council; and also Sir *Alexander Binnie*.

Evidence for the defendants was given by: Mr. *A. A. Johnston*, the Engineer to the defendant Company; Mr. *J. H. Brown*, the former Engineer, and now Engineer and General Manager of the Nottingham Gas Department; Mr. *Alfred Carter*, the river bailiff; Mr. *Whiteley*, the District Surveyor for the Essex County Council, who spoke to putting on a gang of men to clear the bridge, which took two or three days; Mr. *W. J. Leighton*, a man who took part in the same work; and Mr. *A. C. Hurtzig*.

Mr. LAWSON WALTON, in summing up the case for the defendants, pointed out that a great deal had been discovered since the previous trial, and that the materials for coming to a decision were very different from those put before the other tribunal.

Mr. SHEARMAN replied on behalf of the plaintiffs at some length on Saturday morning. He contended that when the defendants closed the channel of the Aldersbrook it was part of a running stream, and that this action had caused the damage complained of. He submitted that two questions should be left to the Jury: (1) Did the defendants close up what was part of an ancient watercourse? (2) Did the water flow over the land of the plaintiffs from the place where the defendants had closed that watercourse?

Justice DARLING said he did not propose to leave any question to the Jury except that raised on the pleadings, which was whether the defendants were guilty of negligence in the exercise of their statutory powers.

Mr. SHEARMAN then went on to argue that the defendants, in closing the Aldersbrook, did not take reasonable and proper care to prevent damage to their neighbours. He concluded by submitting that the defendants could not escape from their responsibility on the plea that the injury was due to the act of God or to natural causes.

Justice DARLING then proceeded to sum up. He said this was an action to recover damages from the defendants for negligently doing certain works which they were authorized to do; or, alternatively, for accumulating a body of water on their premises, and not taking care of it. If either of these cases was proved, the plaintiffs would be entitled to a verdict; but one case or the other must be proved. His Lordship then gave a narrative of what had taken place in this locality—going back to the time of the Romans, who built the Romford Road, but were content with a ford where the Ilford Bridge now stood. He also referred to what had been done since the flood—the old three-arch bridge having been replaced by a larger one with a single arch. Having made some satirical remarks on the elaborate evidence which had been given to prove that water would find its own level, and other elementary propositions, his Lordship proceeded to deal generally with the circumstances of the flood—commenting particularly on the partial blocking of the Ilford Bridge over the Roding, which Mr. Shearman now said was immaterial, but the evidence about which he did his utmost to controvert. He clearly indicated his opinion, though it was for the Jury to decide, that he agreed with the view expressed by Mr. Carter, the Marsh Bailiff, that this blocking of the bridge was the main cause of the damage. In conclusion, he warned the Jury against paying any attention to the statement that in a former case another plaintiff had obtained a verdict against the defendants in respect of the same flood. It had, and could have, no effect on the present case, and ought not to have been introduced.

The Jury retired at 12.20; but, being unable to agree, they were discharged without giving a verdict.

The case was again before the Court yesterday, when Mr. DUKE said there was a question whether the plaintiffs had any cause of action that arose upon their title.

His LORDSHIP asked whether the argument would take any time.

Mr. DUKE thought not. The short fact, as he understood it, was that the plaintiffs were second mortgagees, and were not in possession at the time of the alleged mischief; and the question was whether they had any cause of action.

His LORDSHIP said if Counsel would agree upon a day, he would take it any time after the 13th inst.

Fraudulent Interference with Gas-Fittings.

At the Burton-on-Trent Police Court a few days ago, a considerable amount of interest was manifested in a summons issued on behalf of the Corporation against Thomas Wright, fitter, of 167, Shobnall Street, on a charge of having connected the gas-fittings in his house with the main without their consent. Mr. F. W. Richardson, who appeared on behalf of the Corporation, explained how a Corporation fitter disconnected the meter on the defendant's premises, turned off, as he thought, the supply to the house, and found that the cooking-stove and other fittings could still be lighted. On returning to the house in the evening with a foreman, he found that an alteration in the pipes had been hastily made. Examination proved that a T-joint had been used which gave a free supply, the joint replacing the Corporation's elbow joint. He asked for the full penalty to be inflicted, as it was one of those cases of fraudulent consumption of gas which could only be detected with difficulty. The case was fully proved, and the defendant admitted having taken gas since last October without the meter recording his consumption. He was fined £5 and 10s. 6d. costs.

The Bankruptcy of Mr. Ellis Lever.

At the Bangor Bankruptcy Court, last Thursday, the Assistant Official Receiver stated that he did not propose to make any further examination in the case of Mr. Ellis Lever, who came up for his adjourned examination. [The matter was referred to in the "JOURNAL" for Dec. 6 last.] The amended statement of affairs ordered was still irregular, and the Official Receiver was dissatisfied with the cash account submitted, which simply gave a series of totals without any details; and inasmuch as the examination had already stood over for more than two months, he now applied for an adjournment *sine die*. Mr. J. Barton, who appeared for the debtor, said he had done all he could, and it was impossible to do more. The order made upon the debtor for the filing of a cash account covering a period of ten years was somewhat unreasonable. The Assistant Official Receiver still insisted on his point, and remarked that he required details of the large sums mentioned in the statement submittted. Mr. Barton finally suggested that the order should be reduced to five years. On the suggestion of the Registrar, the Assistant Official Receiver agreed to this, but asked that the return should be filed within 14 days. The debtor, however, stated that he could not do it in that time; and the Registrar made an order for the production of a cash account covering the last five years, to be filed within a month, for which period the examination was again adjourned.

Disputed Charge for Water.

At the Epsom Police Court, on Monday last week, Mr. John Seear, of The Quarry, Cheam, was sued by the Sutton District Water Company for one year's water-rate for a domestic supply to his premises, based upon their annual value, from Dec. 25, 1903, to Dec. 25, 1904. The amount in question was £12, being 5 per cent. upon the rack-rent. The matter had been before the Court on a previous occasion, when objection had been taken, on behalf of the defendant, that the Court had no jurisdiction, as, assuming the Company could recover, they should have brought their action more than six months before; and it was contended that, under the Summary Jurisdication Act, the Court could not hear a claim that was out of time. Mr. Gibson, who appeared for the Company, said the Company would give up their claim for the first six months; so that the amount was reduced to one-half. He went on to state that Mr. Rossiter, who represented the defendant, admitted that Mr. Seear was the occupier of the dwelling-house and premises, that the water had been supplied to him, and that the rack-rent was £240 per annum, which worked out, at 5 per cent., to the amount the Company had sued for. Mr. Rossiter said he did not admit a rack-rent of £240 for the purposes of domestic supply, having regard to the grounds in which the house stood. Mr. Gibson said the charge was upon the gross annual value of the premises. Mr. Rossiter said that in 1898, after a long correspondence, the Company agreed to supply Mr. Seear by meter. They did so for five years, and in September, 1903, Mr. Seear, wrote to them with reference to the supply of some fire-hydrants which it was proposed to have erected. The Company then gave him notice that the whole question would have to be reconsidered. His point was that the Company had no power in law to tell Mr. Seear or any other consumer that if he used water he must have it upon the terms they laid down. The Chairman of the Bench remarked that the Company could change their mind. Mr. Rossiter admitted that they could, but not without Mr. Seear's consent. He went on to contend that by the contract entered into the Company agreed to supply Mr. Seear by meter. With all words such as "may" he could give authority upon authority that where a word of that nature was what might be called permissive or enabling, and power was placed in the hands of a public body to be used for the public interest, that word became obligatory. According to section 51 of the Company's Act, they were to supply water "at the request of the owner or occupier." His substantial point was that Mr. Seear had never requested that water should be supplied to him, making him liable to pay on the rack-rent of the premises. After some further argument, the Bench gave their decision in favour of the Company, with costs. Mr. Rossiter gave notice of appeal.

MISCELLANEOUS NEWS.

BRENTFORD GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the Brentford Company will present at the half-yearly general meeting on the 17th inst., they state that the business continues to progress, the increase in the sale of gas being 3·81 per cent. over the corresponding period of 1903. There is a slight diminution in the gas-rental for the half year, despite the increase in the quantity of gas sold; but this arises from the reduction in price from 2s. 11d. per 1000 cubic feet during the six months ended Dec. 31, 1903, to 2s. 9d. per 1000 cubic feet last half year.

The accounts accompanying the report show that the revenue from the sale of gas was £151,622, against £154,678 in the six months ending Dec. 31, 1903; the rental of meters and stoves was £14,758, compared with £14,516; residuals produced £30,121, against £34,443; and the total receipts were £196,541, against £203,692. The cause of the difference in the gas-rental figures has been already explained; and the Directors state that the diminished receipts for residuals are to be accounted for by the depression in the markets for coke and tar. Turning to the expenditure, the cost of manufacturing gas was £102,402, against £105,689; of distribution, £28,666, compared with £28,838; and of management, £5619, against £5236. The total expenses in the half year were £151,325, whereas in the corresponding period of 1903 they were £153,726; the balance carried to the net revenue account being £45 216 now, compared with £49,966 a year ago. The amount available for distribution is £99,783; and the Directors recommend the usual dividends, at the rates of 5, 12, and 9 per cent., on the preference, consolidated, and new stocks respectively. The working statements in the accounts show that 74 982 tons of Newcastle coal and "Solar" oil equivalent to 33,609 tons more were used in the half year in the manufacture of 1,184,742,000 cubic feet of gas, of which 1,102,001,000 cubic feet are accounted for. The residuals were: Coke, 46,885 tons; breeze, 5847 tons; tar, 829,661 gallons; and ammoniacal liquor, 20,885 butts.

SOUTH SUBURBAN GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report of the Directors of the South Suburban Company for the six months to Dec. 31, which, with the accounts, will be presented at the half-yearly meeting on Friday:—

The profit on the half year's working is sufficient to enable the Directors to recommend the same dividend as the last—viz., at the rate of 5½ per cent.—and to add £1311 5s. 10d. to the undivided balance, making it £7142 0s. 8d. From this, however, they propose to take £2200 for the insurance fund, which will then amount to £12,140 2s. 3d., and the balance carried forward will be £4942 0s. 8d. There is also the reserve fund of £40,801 2s. 6d.; making a total of £57,883 to meet possible contingencies.

In the last report, the proprietors were informed that the Directors had given up enrichment with carburetted water gas, and that oxide of iron had taken the place of lime purification in consequence of the impossibility to enrich the gas and to use lime without causing grave inconvenience to the inhabitants of the neighbourhood of the gas-works. Unmixed coal gas, although of a slightly lower illuminating power, is better for the consumers than a mixture of coal and water gas; and the nuisance caused by the use of lime was an evil with which a few grains of sulphur more or less in the gas could not be compared. They therefore issued a circular to the consumers giving a full explanation of the above, and stated that the abolition of enrichment would effect some saving in manufacture—about ½d. per candle per 1000 cubic feet; but to make sure that the entire saving should go to the consumers, the price of gas was reduced 1d. (to 2s. 5d.) per 1000 feet from Midsummer last, which has left during the half year £2700 in the pockets of the consumers, and diminished the gas-rental to this extent. In the circular to the consumers, the local authorities were requested to deal with the matter in a reasonable spirit, and give the experiment a fair trial. Five of the six Councils have done this, and the Directors take the opportunity of thanking them for their consideration.

The Bill the Directors are promoting, for which your consent will be asked at the Wharncliffe meeting that will follow the ordinary meeting, is the third, and the Directors hope it will, by being successful, be the last, attempt to free the Company from the necessity to enrich the gas, by reducing the nominal illuminating power to a point which can be maintained from the available supply of coal; and also to repeal the sulphur clauses in the Acts of 1873 and 1893, which require the Company to use lime for purification. On this point the Departmental Committee of the Board of Trade has made an emphatic declaration which there is every reason to believe will deliver gas companies from all further trouble about infinitesimal sulphur compounds.

The scheme for the election of employee Directors which was agreed to at the last meeting has been approved by the Board of Trade, and will be put into operation during the present year. The spirit of goodwill towards the Company animating all classes of employees gives the Directors the assurance that they will select the best and most suitable men for Directors, and that the experiment at the South Suburban Gas Company will be no less successful than it has been with the neighbouring Company. This will make our co-partnership complete. The employees as stockholders share in profits and losses, and by the election of Directors will share in management and responsibility. Partnership appears to be the true and ultimate solution of the differences between capital and labour. The Company has travelled far on this road, for practically all the officers and workmen, to the number of about 530, are shareholders, holding stock of the value of £16,000; and with £6000 on deposit at interest, they have a total holding in the Company of £22,000.

The accounts accompanying the report show that the total amount of capital paid up on the 31st of December, including premiums, was £788,415; but on the same date there had been expended £788,444, of which £3729 was spent in the second half of the year. The account has consequently been overdrawn to the extent of £29. There is, however, unissued stock to the amount of £50,000, and £87,484 can be raised on debentures. The revenue account shows that the sale of gas produced £79,288; rental of meters and stoves, £5459; residuals, £26,952; and rents, £70—making a total of £111,769. The principal items of expenditure are: Manufacture (including £47,767 for coals), £69,323; distribution, £9678; rent, rates, and taxes, £3987; and management, £4704—sundry expenses (including £1500 for co-partnership and £711 for pensions, &c.) making up a total of £90,075, and leaving £21,694 to go to the net revenue account. The balance applicable to dividend is £22,254. The working statements show that 68,441 tons of coal and 15,082 gallons of gas oil were used in the half year to produce 718,427,000 cubic feet of coal gas and 7,142,000 cubic feet of oil gas—together, 725,569,000 cubic feet—of which 666,308,000 cubic feet are accounted for. The residual products were: Coke, 821,292 cwt.; breeze, 20,805 yards; coal tar, 745,973 gallons; oil tar, 773 gallons; ammoniacal liquor, 14,298 butts; and sulphate of ammonia, 532 tons.

BRISTOL GAS COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of this Company will present to the proprietors at the 104th half yearly meeting next Thursday, they state that the working in the six months ending the 31st of December was most satisfactory. This is borne out by the accounts which accompany the report; for, notwithstanding the reduction in the price of gas, which took effect from the 1st of July, the revenue did not decrease to any very appreciable extent. The receipts from private consumers came to £112,792, and from public lighting to £8514—together, £121,306—against £114,078 and £9492 in the latter half of 1903. The rental of meters and stoves, on the other hand, produced higher returns; as, on the whole, did residuals—£46,599, compared with £45,177—tar and ammoniacal liquor being better. The total revenue was £173,444, whereas this time last year it was £175,058. On the expenditure side of the revenue account, the manufacture of gas is shown to have cost £111,353, against £107,858 in the six months ending Dec. 31, 1903; distribution, £9259, compared with £8195; and management, £5761, against £5593—the total expenditure being £133,252, in comparison with £129,897. The balance carried to the net revenue account is £40,192; whereas this time last year it was £45,161. The amount available for distribution is £69,630; and the Directors recommend the declaration of a dividend on the nominal capital of the Company at the rate of 5 per cent. per annum. After paying this and the interest on the debenture stock, the balance of profit on the half-year's working is £6517; and the balance of net revenue carried to the next account is £41,567. The statements relating to the working show that 120,776 tons of coal and 4682 tons of cannel were carbonized in the six months covered by the accounts; the estimated quantities of residuals produced being as follows: Ordinary coke, 76,778 tons; cannel coke, 1176 tons; breeze, 11,066 tons; tar, 1,333,440 gallons; and ammoniacal liquor, 2,985,199 gallons.

LONDON BOROUGH COUNCILS AND THE GAS BILLS.

At the Meeting last Wednesday of the Lewisham Borough Council, the General Purposes Committee brought up a report in which they said they had under consideration the Bill proposed to be introduced next session by the South Suburban Gas Company, by which it was proposed to reduce the illuminating power of their gas and to alter the legal method of testing. The Committee said they would report upon the provisions of the Bill at a later date. In the meantime, they considered it desirable, for the protection of the Council, that a petition should be lodged against the Bill; and they recommended that this should be done. The report and recommendation were agreed to.

The Camberwell Borough Council adopted motions *nem. con.* last Wednesday to petition in favour of the London Gas Bill and against the South Suburban Gas Bill, the Gaslight and Coke, South Metropolitan, and Commercial Gas Company's Bill, and the South Metropolitan Gas Bill. The petition against the last is to ask (*inter alia*) for clauses to be inserted that the property and land proposed to be acquired by the Company shall not be used so as to become a nuisance to the inhabitants of the borough; that full rates shall be paid to the Council with respect to the houses and premises acquired, based on the assessment in force at the passing of the Act, until the re-assessment of the premises of the Company shall have been completed and brought into force, with a provision that the sum so assessed shall not be less than that receivable in respect of such land, houses, and premises before the acquisition by the Company; and that provision be made for re-housing the tenants of the property taken. Also that clauses be inserted for the protection of the rating and assessment of property; for protection against injury to the Council's sewer; and to provide for access thereto for repairs and other purposes, or, if necessary, for the diversion of the drainage here and the abandonment of the sewer and construction of a new one at the cost of the Company, and for the general protection of the interests of the borough. The Council further decided that all proposals in Bills to lay down pipes or other works in the subsoil of any highway be strongly opposed, except such works as may be necessary for the construction of the London County Council's tramways under Bill No. 9; and that a general clause be inserted in each Bill, where applicable, protecting the Council against any expense incurred in the removal of, or alteration to, the mains of private companies when carrying out public improvements.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Friday, at the Offices, Horseferry Road, Westminster—Colonel Sir W. T. MAKINS, Bart. (the Governor) in the chair.

The SECRETARY (Mr. H. Rayner) read the notice convening the meeting; and the seal of the Company was affixed to the Register of Proprietors.

The GOVERNOR: I presume that the proprietors will wish the half-yearly report and accounts, which were transmitted to them on the 23rd ult., to be taken as read.

CAPITAL EXPENDITURE.

In dealing with the accounts for the past half year, I turn first to the capital account. There has been a net expenditure under this head of £83,493 on mains, service-pipes, meters, and stoves. This outlay has been entirely under the head of "Distribution," and is rendered necessary by the increase in the number of consumers of gas for lighting, heating, and power purposes. During the half year, there has been an increase of 14,949 automatic meter consumers and 2377 ordinary consumers; also an increase of 11,507 stoves sold to, and hired by, ordinary consumers, and 9915 hired by automatic meter consumers. If we take the whole year, there has been an increase of 31,033 automatic meter consumers, and an increase of 22,048 stoves let out on hire to them. No capital expenditure has been necessary for carbonizing plant.

THE REVENUE ACCOUNT.

Coming to the revenue account, there is an increase of 2 per cent. for the half year in the quantity of gas sold, which makes the increase for the year just ended 2¾ per cent. This increase of 2 per cent. was not, however, large enough to compensate for (1) the reduction of 1d. per 1000 cubic feet in the price of gas, which the Directors made as from the end of June last, and which benefited the consumers for the half year to the extent of about £40,000; (2) for the discounts granted in January, 1904; and (3) for the reduction in receipts for gas sold on the south side of the river and to public authorities on the north side. The net result is a decrease in gas-rental of £33,268. Stove rental shows a satisfactory increase of £3092. Residuals, generally, with the exception of those under the head of ammoniacal liquor and sulphate of ammonia, have produced a poor return. The income from coke shows a falling off of more than £40,000; and tar and its products of over £20,000. These results will not, however, be unexpected by the shareholders, as it was explained to them at the last two half-yearly meetings that the then existing high prices of residuals were not likely to be of long duration; and, in fact, in August last I took occasion to point out that the next half year would show very different results—a prophecy which, I am sorry to say, has been fulfilled. The result for the half year is a decrease in income from all sources of £92,780, which is practically accounted for under three heads—viz., the reduction of £33,000 in gas-rental, of £40,000 in the income from coke, and of £20,000 in the income from tar and its products. Happily, however, savings in various directions have, to some extent, met this reduction in income. I need not touch on all the various items in which economies have been effected; but it will suffice if I point out the most prominent. Under the heading of "Manufacture," there is a saving of about £17,000 in coal and oil, and nearly £10,000 on manufacturing wages, which, with other smaller savings effected in purification and wear and tear, amount altogether to £35,048. On the other hand, there were slight increases under various heads in the charges for distribution, amounting in all to £8300; but these are more than accounted for by the increased volume of business which has been done in this department during the half year. Rates and taxes show an increase of over £10,000, due partly to an adjustment of the income-tax, and partly to a further increase of rates of 1½d. in the pound.

THE FINANCIAL POSITION.

To summarize: The result of the half-year's working has been as follows: The gross income was less than in the corresponding half year of 1903 by £92,780; but the expenditure shows a decrease of £18,972. The gross profit on the half-year's trading is £513,070. After providing for the fixed charges, and setting aside £10,000 to the redemption fund, in accordance with the provisions of the Company's Act of 1903, and adding the amount brought forward from last half year, there is left £583,543 available for the payment of the dividend. The Directors have therefore recommended the payment of a dividend on the ordinary stock of the Company at the statutory rate of £4 8s. per cent. per annum. This will absorb £335,350, and leave £248,192 to be carried forward to the credit of the current half-year's accounts, or £25,000 less than was carried forward in June last, which amount has been taken from the undivided balance to make up the statutory dividend at the rate of £4 8s. per cent. It may come as a disappointment to some that a higher dividend is not recommended; but it was impossible on this occasion to do so, seeing that, under the Statutes governing the Company's operations, the highest price charged for gas at any time during a calendar year fixes the authorized rate of dividend for that year. In this case, the price was only reduced as from July 1, and therefore no extra dividend could be paid. This fact was pointed out by me to the proprietors at the meeting in August last. With the present price of 2s. 11d. per 1000 cubic feet, the statutory rate of dividend for 1905 would be £4 10s. 8d. per cent. When all the circumstances of the past half-year's working are taken into account—namely, that the price of gas has been reduced 1d., and that the market for residual products has been very much depressed—there is no reason to regard the result as unsatisfactory. Then, with regard to the future, there does not seem to be any reason to anticipate an immediate improvement in the condition of the market for residuals. The cement trade is still in a depressed state; and there is not therefore the same brisk demand for coke that there otherwise would be.

A SUPERANNUATION FUND ESTABLISHED.

Leaving the accounts, and coming to matters of general interest, the Directors have long been anxious to establish a superannuation fund for the benefit of the officers of the Company. Hitherto it has been customary to grant pensions to officers on retirement after long and faithful service; but it was felt desirable if possible to establish a fund to which the officers would themselves subscribe as well as the Company, and which would work automatically and put an end to all special appeals. After having taken professional advice, and after most careful consideration lasting over several months, a scheme was drafted, and has been accepted by the officers. I do not propose to go into details with regard to it, but I may point out one or two of the chief features of the fund. After attaining the age of sixty, an officer with forty years' service will obtain a pension of one-half of his final salary. A deduction of one fortieth will be made in the pension for every year the officer's age is short of sixty or his service is short of forty years. The Company and the officers subscribe equally to the fund; the rate of subscription being 4 per cent. on the officer's salary if over thirty years of age, and 3 per cent. if below it. The fund came into operation on Jan. 1, and it is believed that it will ultimately be a great advantage to the staff and the Company. There will not be any immediate reduction in expenditure under the head of annuities—in fact, it is certain to be somewhat increased during the next few years, seeing that the Company will have to pay, in addition to the annuities already granted, a subscription to the superannuation fund. In the near future, however, the mutual character of the fund will make itself felt, and the outlay under this head will gradually diminish until it becomes but a small proportion of what it is at present. If anyone likes to look at the rules of the fund, we shall be glad to provide him with a copy.

THE EARL'S COURT EXHIBITION.

During the half year, a very important Gas Exhibition has, as you are doubtless well aware, been held at Earl's Court. The Directors made special efforts to help the exhibition; and, in addition, the various firms who are interested in the manufacture and sale of gas appliances warmly supported it. And the result was a most interesting and successful display of all the latest forms of gas lighting, cooking, and heating appliances. The Directors believe that much good will result from the public having had ocular demonstration of the great advance which has been made in the manifold uses of gas. It is now able to compete with its lighting rival electricity in all departments, even in that of artistic illumination, which has long been claimed as the special province of that system.

LIGHTING AND EXTINGUISHING GAS-BURNERS.

One of the chief advantages claimed in favour of the electric light is that, by means of switches, it can be turned on or off from a distance, thus avoiding the use of tapers, matches, &c. This advantage is, however, no longer a monopoly of electricity, for the switch system has been extended to gas, and, in order that the shareholders present may see for themselves something of what has been done in this direction, I have had some burners in this hall fitted up with one of the many new appliances for lighting and extinguishing gas-flames. On each side of the clock on the wall there are two burners. I have a switch here, which I will press with my finger, and you see the gas in those burners is immediately lighted. By reversing the operation—that is, by again pressing a switch—you see the gas is extinguished. I may say that for churches and halls and suchlike buildings this is naturally an important advantage; and it must be a great help to us in pushing the use of gas for lighting purposes.

THE MAINTENANCE SYSTEM.

While dealing with the question of lighting, I might again call attention to the facilities which the Company afford to consumers in the matter of maintenance of mantles. We have a staff of trained men who perform this work, for which we make a charge of 9d. per burner per quarter. This is much appreciated by many of the consumers; and the number of burners maintained has reached the figure of 110,713—an increase of 23,356 during the past half year. I am sure that this maintenance system only requires to be more widely known in order to induce an even greater number of consumers to avail themselves of it.

BURDEN OF THE RATES.

During the year on which we have just entered, the quinquennial re-valuation of the Company's property will take place; and a very special effort will be made to obtain some relief from the present heavy burden of rates. The rates and taxes paid by the Company now amount to nearly £290,000 per annum—3·3d. per 1000 cubic feet—and the tendency is always upwards. The rating question is a most serious one for all large businesses. Many factories have been removed from London in order to avoid the high rates; and in this way the local authorities are killing the goose that lays the golden eggs. Unfortunately, a gas company cannot remove their works elsewhere; and the only thing that can be done is to make every effort when the opportunity arises to obtain relief.

PROJECTED LEGISLATION.

There are several Bills before Parliament which are of importance to the Company. I shall deal at length with those promoted by the three Metropolitan Gas Companies and by the London County Council at the Wharncliffe Meeting, which is to be held immediately after this meeting; but I should like now to mention one or two of the other Bills that are being promoted. There are no less than three measures

dealing with the Port of London—the London Port and Docks Commission Bill, promoted by the London County Council; the Thames Conservancy Bill, promoted by the Thames Conservancy; and the Thames Harbour Bill, promoted by private individuals. These measures all have the same object—namely, to obtain power to impose rates upon the merchandise (including coal) imported into the river. This would be a very serious thing for the Company, burdened as we are already with heavy rates and taxes. Moreover, the proposals to deepen the river, &c., are not such as would in any way be of benefit to the Company. Therefore, the Bills will be closely watched with a view to secure the necessary protection.

THE RETIREMENT OF MR. TREWBY.

The only important change in the staff during the six months under review has been caused by the retirement of Mr. Trewby, who has had charge of the engineering branch of the Company's business for many years. He retires after a long period of service, and takes with him the good wishes of the Directors and the staff. Mr. Goulden, the Deputy Chief Engineer, has been appointed Chief Engineer in succession to Mr. Trewby; and the Directors believe that by him the engineering work of the Company will be faithfully and ably looked after. Mr. Goulden was for some years Engineer-in-Charge of the Beckton works, which service, together with his subsequent experience as Deputy Chief Engineer, eminently fits him for the post he has been appointed to occupy.

THE MOTION TO ADOPT THE REPORT.

I now move—"That this meeting do agree with and confirm the report of the Directors and the Auditors' report and statement of the accounts of the Company as transmitted to the proprietors on the 23rd ult."

The DEPUTY-GOVERNOR (Mr. H. C. Ward) seconded the motion.

Mr. BENNETT asked whether the Company were prohibited by Parliament, or by the Articles of Association, from paying more than £4 8s. by way of dividend, and also what was done with the £175,000 which was carried forward from last year. Had the money been invested? If not, he should be glad to know what had become of it.

Mr. C. E. JONES said the accounts were, to some extent, disappointing; and he had no doubt many would sympathize with the last speaker, who evidently wanted an increased dividend. But unfortunately circumstances were against them, as the small economies the Company had been able to effect had not compensated for the very serious loss on the sale of residuals—viz., £62,000—to say nothing of the increase in rates and taxes of £10,000, which to his mind was a positive scandal. Notwithstanding these losses, however, the Company were able to pay the same rate of dividend; and had it not been for the fall in the price of residuals, he had no doubt they would have been in a position to pay 1 per cent. more, which would have been very acceptable to the shareholders, as they had been tied down to one sum for a considerable time. It seemed as if something always turned up to deprive them of prospective profits. He noticed that there had been a considerable saving in the manufacture of gas, and an increase in the amount for distribution. As the Chairman always invited honest criticism, he should be glad if a little more illumination could be thrown on this item. In salaries and wages there was also a jump; and this progressive movement was evident under the head of management. He did not believe in under-paying engineers or clerks—in fact, his idea was to pay well and get the best possible men. But in gas undertakings most of the work was purely a repetition of what had gone before, and could be done by any person of ordinary intelligence. He should like to ask whether the Company employed female labour. There was no doubt ladies had quite as much ability as gentlemen—in most cases a little more—and there were probably plenty of well-deserving young ladies who would be very glad to enter the Company's service. He hoped better times were coming in the future; but the outlook at present did not appear to justify any very laudatory observations from the chair. This was not the time for larger dividends—in fact, they might consider themselves well off if they maintained the existing rate. He hoped the question of economy in lighting and other departments would engage the serious attention of the Directors.

Mr. A. M. PADDON thought the decreased income was due to causes entirely beyond the control of the Directors—such as, for instance, the fall in the price of residuals. On behalf of many suburban gas companies, he wished to express their deep gratitude to the Gaslight and Coke Company for the way in which they had dealt with residuals during the past year. Had it not been for the policy of the Company in this matter, many suburban companies would have shown a greater loss under this head; and he wished that the same policy had been adopted by some of the large adjoining undertakings. The Directors certainly deserved the thanks of the smaller companies for their action in the matter; and though the proprietors had to suffer from the reduction, they had the satisfactory feeling that their own Board had not contributed to the loss. He was much afraid that, in the future, the price of residuals would be still lower.

Sir GEORGE LIVESEY: You are contributing to it by announcing a further reduction.

Mr. PADDON said he cordially agreed with Mr. Jones that the proprietors should not be too eager or greedy in enforcing the provisions of the sliding-scale. He was aware that the Company were wedded to that measure, and that they had not the margin of independence possessed by companies who had a maximum dividend. Parliament had shown a willingness to assent to a reversal of the old maximum dividend. The principle of the sliding-scale was to reduce the price of gas to the consumers, and at the same time to give something to the proprietors; but whom did it please? Before a recent Parliamentary Committee, evidence was given by the London County Council expert that the public were not satisfied with the sliding-scale. Therefore, it was clear that the public were not pleased with it; and the shareholders were not benefited by it. He should be glad to see the principle cut out of any future Bill. He did not know who invented the system; but he wished them joy of it.

The GOVERNOR: If no other member wishes to address the meeting, I will proceed to reply to the remarks which have been made. With regard to Mr. Bennett's question, I think he has hardly mastered the constitution of the Company and the working of the sliding-scale. It is quite impossible for us to distribute any more than we propose to do. The Company's Act of 1898, clause 15, will give the honorable proprietor full information with regard to the way in which we are compelled to deal with this matter. Mr. Bennett also asked what we did with our "carry forward." It remains to the credit of revenue, and is used in the business of the Company. It is not invested; we use it as part of our working capital. Then Mr. Jones travelled over a somewhat wide field. I quite agree with him that circumstances do not justify a very laudatory character in one's remarks on the present occasion; but, on the other hand, they do not warrant anything in the shape of pessimism. I believe the Company's business is on as good and sound a basis as one could wish it to be. We have a moderate return on the capital invested; and we do everything possible to give consumers the best service of gas which we can provide for them. As regards what Mr. Paddon said, I will not go into the question of the policy of the Board in the matter of residuals—especially in the way he put it, in comparison with other companies. Each company has its own particular difficulties with regard to residuals, or its own particular practice, which is governed by the attempts of the Board to do that which is best for their individual concern, and without any desire whatever to injure any other company. Some companies who manufacture water gas, of course, have a use for their coke, and therefore have less to sell; others have no water-gas plant, and so have more to sell. It is undesirable to institute comparisons of this kind; they cannot lead us to any good result. As to Mr. Jones's gallant attempt on behalf of the ladies, I am almost ashamed to say that we have not any female clerks. We are not misogynists at all; but we have intelligent boys who come into our service at the age of seventeen or eighteen, having passed a literary and a medical examination, and these boys will no doubt pass out of the service eventually under the superannuation fund when they reach the age of sixty. Should we need extra labour, we will consider whether we can call in female clerks for typewriting, &c.; but, with regard to the general staff, I think that it is not practicable. The increase from £37,900 in December, 1903, to £39,449 in the past half year—an increase of nearly £1600—is due really, in great measure, to a matter of account. During last year we closed the St. Pancras works as a manufacturing station; and therefore all the expenses which still continue there have been turned on to "Distribution." This accounts for a large portion of the £1600; and the balance is caused, as I have said, by the increase in the volume of business done. We are naturally pushing our stoves and automatic meters as strongly as we can. On the whole, I think the proprietors may be quite content with the present position. There is always some little drop of poison in the cup of joy; but, looking at things from all sides, I think we have every reason to be satisfied.

The resolution for the adoption of the report was put and carried unanimously.

THE DIVIDEND.

The GOVERNOR then moved that the sum of £10,000 be set aside out of the divisible profits for the half year towards the redemption fund, in accordance with the provisions of the Company's Act of 1903, and that the dividends as recommended in the report, be declared.

The DEPUTY-GOVERNOR seconded the resolution; and it was carried unanimously.

The retiring Directors (Mr. John Miles and Sir Hugh Owen), and the Auditors (Messrs. Allen Stoneham and J. J. Walker) were afterwards re-elected.

Extraordinary Meeting.

The SECRETARY having read the notice convening the meeting,

The SOLICITOR read the heads of the Bill.

The GOVERNOR: The shareholders will remember that at the last half-yearly meeting I told them that, before the Companies could take advantage of the recommendations of the Departmental Committee of the Board of Trade on Gas Testing, it would be necessary to obtain parliamentary sanction to the proposed modifications. At that meeting it was considered that, failing action on the part of the Board of Trade, it would be well if the three Metropolitan Gas Companies were to act together in the matter, and promote a Joint Bill. In pursuance of this policy, several meetings have been held between the representatives of the three Companies, and a Bill has been prepared and deposited, the heads of which have already been read to you by the Solicitor. The chief proposal contained in the Bill is the modification of the present provisions as to sulphur impurities. The Departmental Committee recommended that the obligation placed upon the Companies with regard to the removal of the sulphur impurities other than sulphuretted hydrogen, should be abolished, and that the existing statutory provision which requires the gas to be wholly free from sulphuretted hydrogen should be modified; and the Bill seeks to give effect to these and other desirable recommendations. The Bill provides for alterations in the law as to the procedure with regard to penalties. This was also a recommendation of the Departmental Committee. If the Bill should pass into law, the Companies would no longer be summoned to a Police Court in case of any slight deficiency in illuminating power or other accidental default. Provision is made for the abolition of Sunday testing, which I am sure every one will be in favour of. There are other matters contained in the Bill relating to the testing of gas, more especially as to the method in which it is to be consumed in the burner, which are of too technical a character to be dealt with at this meeting, but which are of great importance to the Companies. Some of the recommendations of the Departmental Committee have not been included in the Bill—notably those which provide for the testing of gas for calorific power and in a flat-flame burner. The reason for these omissions is that it is felt that gas undertakings are already so hampered with restrictions, as compared with other purveyors of light and power, such as electric light companies, that it is not desirable or justifiable to institute further regulations. Moreover, it seems inexpedient to institute

a system of testing with a flat-flame burner, as this kind of burner is rapidly going out of use. Competition in all directions may be relied upon to secure the supply of gas of the best quality and at the lowest possible price. The London County Council have also deposited a Bill dealing with the same subject as the Bill of the three Companies. It seems unnecessary that the Council should have adopted this course, seeing that they could have opposed, if they had thought fit, the Joint Bill, with a view to amend it, and in this way would have been equally in a position to look after the interests of the public, and at the same time have saved the great expense involved in promoting a Bill of their own. The Council's Bill contains provisions for the suspension of the sulphur clauses other than those relating to sulphuretted hydrogen and for the alteration of the law as to the mode of recovering forfeitures; but, in addition, it seeks to reduce the standard price of gas supplied by the three Companies by 1d. per 1000 cubic feet. This proposal is one which the three Companies concerned will strenuously oppose; inasmuch as it is quite contrary to the view of the Departmental Committee, which was distinctly expressed, that "the relaxation of the requirements with respect to sulphur purification will undoubtedly be a great relief to the Companies, to whom the existing tests cause great trouble and anxiety; but the Committee do not think that the pecuniary advantage is, in itself, sufficient to justify them in recommending any consequential reduction in the standard price of gas." The Departmental Committee, it is true, then go on to say that the removal of these onerous regulations would furnish an appropriate occasion for revising the present arrangements of the sliding-scale, and substituting for them others in which the standard price and the rate of variation of dividend might be fixed so as to give the Gas Companies greater incentives to economy, while being equally favourable to the public under normal circumstances. But this is just what the London County Council cannot see their way to propose; and they have said so in so many words. They have therefore adopted the expedient of proposing to cut down the standard price for the purpose of stimulating economy—a proposal about equivalent to reducing a man's salary in order to encourage him to greater thrift. There is another reason why the proposal should be opposed by the Company, as it was only so recently as the year 1903 that the Company's standard price was, by arrangement, reduced by no less than 5d.; and it seems extremely unjust that, after so recent a settlement has been come to, the London County Council should try to reopen the question, especially when it is remembered that, whatever saving may be effected by the abolition of the sulphur restrictions, five-sixths of the saving would go to the consumers, and only one-sixth to the shareholders. There are other matters in the Bill to which the Company take exception, such as testing gas for calorific power and in flat-flame burners, and the clause dealing with the rate of burning the gas for testing purposes. The latter is a matter of considerable importance to the Company; but as it is of a technical character, I need not trouble you with the details. It is but right to say, however, that the points of agreement in the two Bills are so numerous—viz., the abolition of the sulphur impurities clauses, the modification of the test for sulphuretted hydrogen, the abolition of Sunday testing, the extension of the powers of the Chief Gas Examiner, and the modification of the law as it at present stands with regard to forfeitures and Police Court procedure—that there ought not to be any serious difficulty in the way of coming to an agreement between the Companies and the Council, and thus avoiding the necessity of a long and expensive fight on both sides. At any rate, the Directors of this Company are perfectly ready to enter into negotiations with a view to arriving at an amicable settlement. I beg leave to move: "That the Bill now submitted, intituled 'A Bill to amend the Acts relating to the Gaslight and Coke, South Metropolitan, and Commercial Gas Companies with regard to the testing of gas, procedure for forfeitures, and otherwise,' be, and the same is, hereby approved, subject to such amendments or alterations as may be made therein by Parliament and be assented to by the Directors."

Mr. H. C. WARD seconded the motion.

Mr. ENNIS said he gathered from the Governor's statement that the provisions of the proposed Bill were limited to the Administrative County of London; but, so far as he could tell, the district of the Company extended beyond the county. If so, the result would be that here and there would be pieces to which the provisions with regard to the sulphur and sulphuretted hydrogen clauses would not apply. This he thought very inconvenient; and he would suggest that the following words should be inserted: "The limitation of the Act is to the district or districts now supplied, or hereafter to be supplied," by them.

Sir GEORGE LIVESEY: Mr. Chairman, I am very pleased to say that the other Companies—I believe I can answer for one, and I think I know the opinion of the other also—are thoroughly in accord with the Gaslight and Coke Company in this matter. It is an augury of a very good omen that the three Companies are at last pulling together and working loyally in support of the great gas industry which they represent. I quite see the point which Mr. Ennis has raised; and I believe that the whole of our three districts are included in the Administrative County of London. But, at any rate, I think that in the small detached parts outside there is no right to test the gas. It is a great satisfaction to feel that the Departmental Committee have shown the absurdity of those sulphur restrictions which have at last met their fate. But the most satisfactory thing is that the three Companies are working together. I quite agree that the proposal of the London County Council to reduce the initial price by 1d. is one that we shall all strenuously oppose; it is a most paltry thing. The South Metropolitan Company reduced their price 5d. so lately as 1900; and the Commercial reduced theirs to the same figure in 1902 or 1903—I forget which—and the Gaslight and Coke Company in 1903. So that our initial prices may be considered to have been settled by Parliament within the last five years in the case of all the Companies; and to reopen them is an act of meanness on the part of the County Council, which is worthy of them.

The GOVERNOR: I agree with Sir George Livesey and with Mr. Ennis that it is an awkward thing that a portion of our district should be under different regulations from the rest; but I am afraid there are parliamentary and legal difficulties in the way of dealing with it. If we find there are any means of bringing the whole thing into line, of course we shall do it; but I am afraid there are technical difficulties which will render it impossible, and that those portions of the present system will be continued as now—there will be no alteration.

The resolution was then put and carried unanimously.

The GOVERNOR said this concluded the business of the day.

A vote of thanks to the Governor for presiding, and to the Board for their able management of the affairs of the Company, brought the proceedings to a close.

PUBLIC LIGHTING IN MARYLEBONE.

In a report circulated last Wednesday, the Lighting Committee of the Marylebone Borough Council stated that, having considered a proposed rearrangement of the public lamps on the Marylebone side of Edgware Road and Maida Vale, they had decided to increase the number from 85 to 107—the whole to be set back inside the kerb, and to be fitted with incandescent gas-burners, at a total estimated cost of £530. This amount practically disposed, the report went on to explain, of the estimate of £4000 agreed by the Council to be expended during the current financial year in respect of the adoption of the incandescent system of gas lighting throughout the streets of the borough. In a further report, the Committee said they had considered the estimates for the financial year 1905-6. The sum of £3849 had been expended as under during the past twelve months for incandescent gas lighting: Contract with Messrs. S. Pontifex and Co., £2594; unforeseen expenditure, £1255. The latter sum was made up as follows: Double in place of single burners, £390; 22 additional lanterns for street corners, £58; 25 additional lamp-columns for street corners, £85; brackets, £6; 193 new lamp-columns, through inability of contractors to set back old columns in consequence of pipes, &c., found under the pavement, £468; 91 removals of lamps and necessary new services, £182; 878 street name-tablets, £66. Out of the amount of £8904 19s. 6d. authorized by the Council in July, 1903, to be expended on incandescent gas lighting, the sum of £5054 19s. 6d. remains unexpended. The Borough Engineer (Mr. J. Paget Waddington, M.Inst.C.E.) had submitted a list of 113 streets in which the incandescent system of gas lighting could be adopted; and the Committee had decided to spend £4900 during the ensuing financial year in this way. The following estimates of expenditure for 1905-6 had been agreed to: Gas for street-lamps, £8000 (expenditure, ascertained and estimated, for 1904-5, £7685); electric arc lamps, £180 (expenditure for 1904-5, £180); new lamp-columns, bases, &c., part installation of incandescent gas-lamps, £4900 (expenditure for 1904-5, £3750); lighting, extinguishing, and cleaning lamps, repairing and maintaining mantles, burners, lanterns, and columns, £4500 (expenditure for 1904-5, £4295); labour, washing columns, &c., £140 (expenditure for 1904-5, £140)—total, £17,720 (total expenditure for 1904-5 £16,050).

THE PUBLIC LIGHTING OF CANTERBURY.

The question of the public lighting of Canterbury came before the City Council at their meeting on Wednesday, in consequence of the receipt of a letter from the Gas and Water Company, offering to convert all the gas-lamps to the incandescent system free of charge if the Council guaranteed a minimum of 150 lights for three years.

The proposal gave rise to a lengthy discussion; the first speaker being Alderman Mason, who considered the offer a generous one, and suggested that it should be accepted. Mr. Anderson, however, thought the matter had been sprung upon them in rather a hurried way, and said he would like it to be referred back to the Lighting Committee for further consideration. He was desirous of knowing the details of their own electrical undertaking for the next three years. He, too, regarded the offer as an excellent one; but he could not help thinking it was a great pity that it had not been made before the Council embarked upon electricity. Mr. Russell expressed the opinion that, in view of their electric lighting works, it would not be wise to tie their hands for three years. The Town Clerk (Mr. H. Fielding) pointed out that the Council had applied for a loan for electric light extensions; and if they put up all the lamps which were included in the loan, they would not have 150 gas-lamps remaining. It seemed to him that the matter should be considered by the Committee before they actually tied their hands. Mr. Stone said there were just one or two things he would like to refer to. In the first place, he was sure that the members ought to hail with a certain amount of satisfaction this advance on the part of the Gas Company. There was no reason why there should be any hostility between them and the Company; for, after all, the Company consisted of a body of gentlemen who were resident ratepayers in Canterbury. Therefore it was an undertaking mainly of their own citizens. In regard to the number of lamps, he thought they would agree with him that, if they had not 150 lamps at the present time, they could easily increase them, because there were places where lamps were badly wanted. There had been districts that had been left in darkness owing to the fact that it would have been too great an initial outlay to extend the electric cable. He thought any impartial person would admit that the ordinary incandescent gas burner was preferable to the incandescent electric light. Alderman Mason pointed out that the mantles that were first introduced gave a comparatively small light; but he said those in use on St. George's Terrace were very different. Mr. Russell said there was nothing in the letter about big mantles; it simply said "incandescent lighting." Alderman Mason, however, stated that the position was that for three years there would be 150 lamps which would be lighted equal to those on the Terrace, without any additional charge. Mr. Smith contended that the minimum number of lamps should be reduced to 100; and he said it should also be borne in mind that the cost of the gas-lamps was £4 4s. each, as against £3 10s. for the electric light. To this Mr. Stone retorted that the Electrical Engineer always

told them that there was a loss on the public electric lighting. The Mayor (Alderman Sir G. Collard) considered that the arrangement would be an advantage to the city. He thought, however, the offer should be referred back before a definite decision was arrived at; and ultimately the letter was sent to the Lighting Committee, with executive powers to deal with the matter.

WEST BROMWICH GAS UNDERTAKING.

Reduced Prepayment Meter Consumption.

At the last Meeting of the West Bromwich Town Council, the Gas Committee reported the completion of the purchase of the ungotten mines under the portion of the Mill Farm Estate adjoining the gas-works, together with certain surface rights and other privileges authorized to be acquired. The Birmingham Canal Navigation Company had offered to pay £500 to the Corporation for the portion of the mines which were necessary to secure the safety of the canal, as well as £105 towards the Corporation's costs in the matter; and the Committee recommended that this should be accepted. Mr. Wilson (the Chairman of the Committee) explained that the sales of gas for the Christmas quarter showed a decrease compared with the corresponding period of the previous year. This was owing to the depressed state of trade; but he felt the worst feature about it was that the falling off was chiefly in connection with the penny-in-the-slot system. The report was approved.

LABOUR TROUBLE AT THE NEATH GAS-WORKS.

The installation of a De Brouwer retort-charger and other labour-saving arrangements at the Neath Gas-Works, by which the Engineer and Manager (Mr. Robert A. Browning) hopes to effect a considerable saving to the town, led to a dispute with the stokers, and a number declined to continue work. It was proposed to change from eight-hour to twelve-hour shifts; and this was objected to. The Town Council met twice in Committee last Tuesday to discuss matters with the men, and as a result a compromise was agreed to. Three points were pressed by the men—viz., eight-hour shifts, the serving of 22 retorts, time-and-a-half for Sunday work, with the further provision that seniority of service should rank for reinstatement. As arranged, the system of working will be three shifts of eight hours; 5s. per shift wages; the men to serve 26 retorts, instead of 22 as offered by the men (and this to be by the way of experiment for three months); time-and-a-half to be paid for Sunday labour; and seniority of service to be considered. The maximum quantity of coal is to be 3½ cwt. for each retort. At the meeting of the Town Council on Thursday, when the minutes of the Gas Committee came up for confirmation, a telegram was read from Mr. Victor Morgan, the District Secretary of the Gas Workers' Union, stating that the stokers had accepted the terms offered.

Wrexham Gas Bill.—The Wrexham Town Council have resolved, by a majority of one, to endeavour to secure the insertion in the Bill which the Gas Company are now promoting of a clause providing that the net charge for gas for public lighting shall not exceed 2s. 3d. per 1000 cubic feet.

Fire at the Ryde Gas-Works.—In the early hours of the morning last Wednesday week, a fire broke out in the condensing shed at the Ryde Gas-Works, through an escape of gas. An employee at once gave the alarm; and the Borough Fire Brigade were quickly on the spot. The timber roof of the shed was then well alight; but masonry on either side prevented the outbreak from spreading, and all danger was soon averted. Damage was principally confined to the roof.

The Otley Gas-Works Purchase Question.—After the defeat by the ratepayers of the Council's proposals with reference to the purchase of the Otley gas undertaking, as recorded in our last issue, the Parliamentary Committee decided to recommend the Council to demand a poll. The necessity of their taking action in the matter was, however, obviated by the handing in, at a special meeting of the Council yesterday week, of a petition, signed by 144 electors, demanding a poll on the questions of purchasing the gas-works and extension of the periods for loans.

Danger of the Electric Light for Operating Rooms.—The following additional evidence as to the danger that may arise from the use of electric light in hospitals and other places where operations are performed, is taken from the minutes of the Wrexham Electricity Committee: "The House Committee of the Wrexham Infirmary report that one night, immediately after an operation in the theatre, the electric light went out, and the place was for some time in total darkness. The operation was upon a young child, and of the most delicate nature; and had the light gone out during the time it was being performed, the life of the patient would inevitably have been lost." The Borough Electrical Engineer has advised the Committee that a turnover switch, with the necessary connection, would prevent the recurrence of such a serious state of affairs.

Double Gas Poisoning Fatality in Belfast.—A few days ago, an inquest was held at Belfast on the bodies of a man named Gray and his son five years of age who were found dead in a room in which they lodged. The evening preceding the occurrence, the landlady turned the gas off at the meter; and subsequently Gray was heard to enter the house. Next morning the gas was turned on again as usual; and as Gray was not at the time in work, there was no necessity for him to leave his room early. In the afternoon, however, the landlady, wanting the boy for some reason, went to the room, where she noticed a very strong smell of gas. Receiving no answer to her calls, she summoned a doctor, who pronounced both father and son to be dead. At the inquest, the doctor said death was caused by gas poisoning; and the Jury returned a verdict in accordance with this evidence.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Mr. Alfred Richards sold a number of gas shares by order of an Executor. The first lots offered consisted of £10 shares in the North Middlesex Gas Company, carrying 7 per cent. dividend; and they fetched £14 17s. 6d. each. A small parcel of ordinary stock of the South Suburban Gas Company (last dividend 5½ per cent.) was sold at the rate of £123 per £100 of stock; and some 5 per cent. perpetual debenture stock at the rate of £130 per £100. Some £10 shares in the Ascot District Gas Company, ranking for a maximum dividend of 10 per cent. per annum, but carrying 5 per cent., fetched from £9 17s. 6d. to £10 1s. per share. A few £10 "A" shares in the Grays Gas Company, Limited (last dividend 8 per cent.), fetched £15 10s. apiece; some "B" shares (last dividend at the rate of £5 12s. per cent.) selling at £11 and £11 2s. 6d. each—in both cases *cum div.* from the 1st of July last. Some £5 shares in the Bombay Gas Company, Limited, on which the dividends for the past four years have been at the rate of 6½ per cent. per annum, free of income-tax, fetched £6 15s. to £7 per share; the purchaser taking the balance of dividend beyond 3 per cent. for the year ending the 31st of December last. A few £5 original shares in the Sunbury Gas Consumers' Company, Limited, carrying a whole year's dividend at the rate of 5 per cent., were sold at a premium of 12s. 6d. per share. Some £10 shares in the Hythe and Sandgate Gas Company, ranking for a maximum dividend of 7 per cent., though the last was at the rate of only 2 per cent., changed hands at £5 12s. 6d. each. The last lot offered was a parcel of 30 fully paid £10 shares in the Soham and District Gas Company, Limited, which were sold for £2 1s. per share. Messrs. Hollis and Webb sold at Leeds last week £500 of consolidated 7 per cent. stock (1887) of the Pudsey Gas Company at the rate of £213 per £100 of stock.

METROPOLITAN WATER BOARD.

The Fortnightly Meeting of the Board was held on Friday, at the offices of the Metropolitan Asylums Board—Sir R. M. BEACHCROFT in the chair.

The Finance Committee submitted the estimates of income and expenditure on the revenue account from the appointed days—June 24 and 25, 1904 (the latter day applying to the New River)—to the 31st prox. The total income was estimated at £2,002,482, while the total estimated expenditure was £1,980,541; leaving an estimated surplus of £21,941. The corresponding income for a similar period last year amounted to £1,969,136, while the expenditure was £1,134,032. The following were the estimates of the various Committees of the Board: Finance, £1,441,074; Works, £474,060; General Purposes, £44,152; Law and Parliamentary, £8553; and Appeal and Assessment, £500. Special expenditure was estimated at £12,202.

Lord WELBY, in moving the reception of the estimates, explained that the Metropolis Water Act directed that at the beginning of each year an estimate of receipts and expenditure should be laid before the Board. The statement was, however, for a broken period of nine months, and was imperfect. Considerable difficulty had been experienced in preparing it, as eight different sets of accounts had to be examined, and the estimates submitted were only approximate. He thought, however, that the statement of expenditure was, on the whole, satisfactory; and there was every reason to believe that the surplus which they had shown would result.

The estimate of each of the Committees was approved.

In the report presented by the Finance Committee, they stated that at the meeting of the Board on Jan. 20 reference was made to an inquiry into the death of a person lately residing at No. 68, Gardiner's Lane, Putney, at which the Coroner was reported to have made the following statement: "Is it a fact that the Water Board can cut off the water supply without informing the sanitary authorities that the house was still occupied? I think it is a very gross neglect of duty." The Coroner was also reported, in his summing up, to have expressed surprise that in the case in question the water supply had been cut off for five weeks, and that, although the person was allowed to occupy the house, no notice was given to the sanitary authorities. He thought the Board had rendered themselves liable to the Public Health Authority. As the result of inquiries into the circumstances referred to at the inquest, the Committee found that the statements alleged to have been made by the Coroner reflecting upon the Board were not justified by the facts. The water was turned off from the house on the 19th of September last, and it was finally cut off on the 4th of November. On each of these dates notice, in writing, of the course taken was given to the Wandsworth Medical Officer of Health; and he, in writing, acknowledged the receipt thereof. The Committee had given instructions for a communication to be addressed to the Coroner calling his attention to the report of the inquest, and acquainting him with the full facts of the case. The Committee were fully alive to the importance of carrying out the intention of the Public Health (London) Act, 1891, and had given instructions that the sanitary authorities should be advised in future when a supply was cut off; the notice to be sent both to the Clerk of the authority and to the Medical Officer of Health. The Board approved the course taken.

The Law and Parliamentary Committee reported that they had been very carefully through the Thames Conservancy Bill with the aid of the Chief Engineer and the Law Clerk, and considered that the Board's interests were adversely affected by the clauses of the Bill, for the following among other reasons: (*a*) They considered the additional representation of the Board on the Thames Conservancy was not adequately provided for by only one additional representative. (*b*) They were not satisfied with the clause in the Bill which dealt with the question of gauging the Board's supplies from the River Thames below Penton Hook. This clause, without alteration, would, in certain circumstances, be seriously detrimental to the Board, and they would press for considerable modifications in respect of this clause. (*c*) In respect of the additional tolls, rates, and dues proposed to be levied by

the Bill, the Board's interests should also be safeguarded. The Committee also expressed the opinion that the Thames Harbour Bill should be petitioned against, for the following reasons: (*a*) That it would enable the promoters to enter into competition with the Board for the sale of water to persons other than for domestic purposes: (*b*) that the proposed raising of the level of the water between Teddington and Gravesend would seriously affect the drainage of the Board's riverside stations and filter-beds. The Board adopted the recommendation of the Committee to lodge petitions against the Bills.

The Works and Stores Committee submitted a return giving details of supply for December last. It showed that the total average daily supply was 208,022,000 gallons. The number of houses, &c., supplied was 994,831, and the estimated population was 6,608,930. The supply per head per day amounted in the mean to 31·4 gallons, against 30·6 gallons in December, 1903. There were 3408 million gallons of water in store in impounding reservoirs at the end of the month; and in addition to this there were 3244 million gallons in store in the Staines reservoirs. The quantity of coal consumed during the month was 12,417 tons. No fewer than 1185 new supplies were laid on, and the length of new mains laid was 6203 yards. The total number of fires was 372; the Southwark and Vauxhall district alone having 140, the New River 69, the East London 53, and the West Middlesex 47.

The Appeal and Assessment Committee in their report drew attention to the conference held on the 27th ult. with the London rating authorities and the London County Council for the purpose of discussing the possibility of coming to some arrangement with regard to the rating of the Board's property, a report of which appeared in the "JOURNAL" last week (p. 307). The Committee stated that in the opinion of many of the delegates the undertaking of the Board should not be valued as a whole, but should be split up into numerous parts corresponding to the undertakings of the former Companies, and each of those parts valued separately. They were given to understand that the point would be raised at the conference, and they therefore referred it to their experts and Counsel, who advised that the proper way to ascertain the rateable value of the Board's undertaking was to estimate it as a whole. While the Committee regretted no definite resolution was arrived at, the voting encouraged them to hope agreements with many of the authorities would be possible; and they therefore proposed to carry out the course of action indicated by the motion which was put to the conference, and to instruct the Board's valuers to prepare a valuation of the entire undertaking and an apportionment thereof among the various rating areas. They purposed recommending the Board to authorize them to arrange for such a valuation: but as the necessary estimate had not been fully considered by the Finance Committee, they postponed making the recommendation.

The first annual report of the Board was presented by the General Purposes Committee and adopted. This report, which was submitted to the Committee by the Clerk (Mr. A. B. Pilling), reviewed the work during the year ended March 31.

Shortage of Water at Leicester.—The reservoirs from which Leicester is supplied with water show a deficiency of 721 million gallons; and the Water Committee, fearing a repetition of a previous water famine, have given notice that the daily supply will be curtailed, while residents are warned that they will be summoned for flushing the street pavements with drinking water.

ASSESSING THE COST OF WATER-MAINS.

In an article on the above subject which appeared in a recent number of the "Engineering Record," the text of a judgment delivered by the Supreme Court of New Jersey in the action of *Doughten v. City of Camden* was given, as having an important bearing upon it. It was pointed out, in a few introductory remarks, that one of the problems which occasionally arise outside his special line of work to trouble the city engineer, is the method of meeting the cost of pavements, sewers, water-mains, and similar improvements. A large number of different systems of providing funds have been proposed, and many of them have been pronounced upon judicially. The Courts of Final Jurisdiction of different States have made various interpretations of the right to levy local assessments for such improvements; and therefore the decision of the Supreme Court is of general interest. The question involved was the right of the Legislature to authorize the city to place a lien on land fronting on either side of a street to the amount of 75 c. per foot, to meet the expenses of laying water-mains. The following was the decision of the Court.

"It was long ago settled by our Court of last resort, as a general proposition, that the cost of a public improvement could be imposed on particularized property only to the extent to which such property was exceptionally benefited. But a distinction was then noticed between improvements which are primarily for the public welfare and only incidentally for the benefit of the landowner, and those of which the converse is true. While with respect to the first class the proposition just stated must be rigidly applied, with respect to the second class the rule is not imperative; and the Legislature may charge the actual cost on the private property to which the chief advantage accrues, even though the benefit be not an exact equivalent. Of this latter class are pavements and kerbs, the gutters of unpaved streets, and the house connections of sewers, which are deemed appendages to the adjoining land.

"On behalf of the city, it is urged that water-pipes laid in urban streets for the common use of the neighbouring inhabitants have the characteristics of this second class. This position seems well supported, at least with regard to those landowners who avail themselves of the conveniences provided. The principal object of these appliances is to furnish water for domestic and business purposes on the adjacent private property, and the value of such a provision is ordinarily greater than that which an improved sidewalk would afford to the property. On the other hand, the essentially public use of a water supply is but small in comparison with the private utility, and is less than the public use of an improved sidewalk. Hence, if sidewalks and their appurtenances are legally regarded as primarily for private benefit and only incidentally for public welfare, there is no reason why water-pipes laid in the streets of our municipalities should not be viewed in the same light. Indeed, this idea of paramount private utility is emphasized in the very statute now under consideration, the title of which designates 'citizens' and 'inhabitants' as the beneficiaries of the legislative scheme. Consequently, the principle which justifies the Legislature in charging against adjoining property the expense of constructing sidewalks will warrant a similar imposition for the laying of water-pipes.

"There are, however, in this State, two cases which may be thought to have a contrary bearing, where it was held that a fixed annual charge levied upon land bordering on streets through which water

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 346.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct. 13	10½	Alliance & Dublin	10 p.c.	21⅞—22⅛	..	4 13 4
100,000	10	,,	7½	Do.	7 p.c.	14⅜—15⅝	+⅛	4 16 9
200,000	5	Nov. 11	6½	Bombay, Ltd.	. . .	6⅛—6⅜	+⅛	4 16 4
140,000	5	,,	6½	Do. New, £4 paid		4⅜—5⅛	+⅛	4 19 1
50,000	10	Aug. 31	14	Bourne- mouth Gas & Water	10 p.c. . .	29—30	..	4 13 4
251,810	10	,,	7		B 7 p.c. .	16—17	..	4 2 4
53,200	10	,,	6		Pref. 6 p.c.	14⅛—15⅜	..	3 17 5
380,000	Stk.	Aug. 12	12	Brentford Consolidated		250 255	..	4 14 1
300,000	,,	,,	9	Do. New	. . .	190—195	..	4 12 4
50,000	,,	,,	5	Do.	5 p.c. Pref. .	130—135	..	3 14 1
206,250	,,	Dec. 15	4	Do.	4 p.c. Deb. .	105—108	..	3 14 1
220,000	Stk.	Sept. 15	11	Brighton & Hove Orig.		228—233	..	4 14 5
246,320	,,	,,	8	Do.	A. Ord. Stk. .	168—173	..	4 12 6
460,000	20	Sept. 29	10	British	. . . . .	41—42	..	4 15 3
100,000	Stk.	Aug. 12	6	Bromley, Ord.	5 p.c. .	117—122	..	4 18 4
165,700	,,	,,	4½	Do.	do. 3½ p.c.	92—95	..	4 13 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.		11⅛—12	..	5 16 8
250,000	Stk.	Dec. 30	4	Do.	4 p.c. Deb. .	93—95	..	4 4 3
150,000	20	July 14	8¼	Cagliari, Ltd.	. . . .	24—26	..	6 6 11
100,000	10	Sept. 29	10	Cape Town & Dis., Ltd.		16¼—16⅝	..	5 19 5
100,000	10	Oct. 27	4½	Do.	4½ p c Pref. .	9⅜—10	..	4 10 0
50,000	50	Nov. 2	6	Do.	6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	Dec. 30	4½	Do.	4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,375,000	Stk.	Aug. 31	5⅝	Commercial	4 p.c Stk. .	117—120	..	4 6 8
560,000	,,	,,	5	Do.	3½ p.c. do. .	113—116	..	4 6 2
450,000	,,	Dec. 15	3	Do.	3 p.c. Deb. Stk.	86—88	..	3 8 2
800,000	Stk.	,,	6½	Continental Union, Ltd.		117—120	..	5 8 4
200,000	,,	,,	7	Do.	7 p c. Pref.	140—145	..	4 16 7
424,070	Stk.	Aug.	5	Derby Con. Stk.	. . .	124—125	..	4 2 0
55,000	,,	Jan. 3	4	Do. Deb. Stk.	. . .	108—110	..	3 12 9
486,090	10	Jan. 27	11	European, Ltd.	. . .	21—22*	..	5 0 0
354,060	10	,,	11	Do.	£7 10s. paid	14½—15½*	..	5 6 6
15,243,200	Stk.	Aug. 12	4⅝	Gas-light and Coke	4 p.c. Ord. . .	93—100	..	4 8 0
2,600,000	,,	,,	3½		3½ p.c. max. . .	93—95	..	3 13 8
3,799,735	,,	,,	4		4 p.c. Con. Pref.	110—112	..	3 11 5
4,193,975	,,	Dec. 15	3		3 p.c Con. Deb.	87—89	..	3 7 5
258,740	Stk.	Sept. 15	5	Hastings & St. L.	3½ p.c.	100—103	..	4 17 1
70,000	10	Sept. 29	11	Hongkong & China, Ltd.		16—17	..	6 9 5
3,800,000	Stk.	Nov. 11	10	Imperial Coatinental	.	210—212	+2	4 14 4
473,600	Stk.	Aug. 12	3½	Do.	3½ p.c. Deb. Red.	96—98	..	3 11 4
175,036	Stk.	Aug. 31	6	Lea Bridge Ord.	5 p.c. .	118—123	..	4 17 7
561,000	Stk.	Aug. 31	10	Liverpool United A	. .	224—226	+2	4 8 6
718,100	,,	,,	7	Do.	do. B .	162—164	+1	4 5 4

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
306,083	Stk.	Dec. 30	4	L'rpool Unit'd Deb. Stk.		107—109	..	3 13 5
75,000	5	Dec. 15	5	Malta & Medn., Ltd.	.	4—4½	..	5 11 1
560,000	100	Oct. 1	5	Met. of Melbourne	5 p.c. Deb. .	103—105	+1	4 15 3
250,000	100	,,	4½		4½ p.c. Deb.	102—104	+2	4 6 7
541,920	20	Nov. 11	3⅜	Monte Video, Ltd.	.	10—11	..	6 7 3
1,515,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.		109—110	..	4 1 10
406,025	Stk.	Dec. 30	3⅜	Do.	3½ p.c. Deb.	90—92	+½	3 16 1
15,000	10	Aug. 31	10	North Middlesex	10 p.c.	19½—20½	..	4 17 7
52,940	1	,,	7	Do.	7 p.c.	13⅜—14⅝	..	4 16 7
300,000	Stk.	Nov. 30	8	Oriental, Ltd.	. . .	148—151	..	5 6 0
600,000	5	Sept. 15	7	Ottoman, Ltd.	. .	5½—6½	..	5 12 0
235,005	Stk.	—	6½	Plym'th & St'house	5 p.c.	—	..	—
398,490	5	Apl. 28	5	Primitiva Ord.	. . .	5⅛—6	..	4 3 4
796,980	5	Jan. 27	5	Do.	5 p.c. Pref. .	4⅞—5⅛*	..	4 15 3
488,900	100	Dec. 1	4	Do.	4 p.c. Deb. .	94—96	..	4 3 4
851,070	10	Oct. 13	7	River Plate Ord.	. . .	12½—12⅞	+⅛	5 9 10
300,000	Stk.	Dec. 30	4	Do.	4 p.c. Deb. .	94—96	..	4 3 4
250,000	10	Sept. 15	6	San Paulo, Ltd.	. . .	12—12½	..	4 16 0
70,030	50	Jan. 3	5	Do.	5 p.c. Deb. .	52—54	..	4 12 7
135,000	Stk.	Sept. 15	10	Sheffield A	. . . .	238—240	..	4 3 4
209,984	,,	,,	10	Do.	B	237—230	..	4 3 8
523,498	,,	,,	10	Do.	C	236—238	..	4 4 0
123,998	Stk.	Sept. 29	5	Shrewsbury Ord.	5 p.c.	104⅛—107½	..	4 13 0
70,000	10	,,	11	South African	. . . .	16—17	..	6 9 5
6,250,000	Stk.	Aug. 12	5⅜	South Met.,	4 p.c. Ord.	130—132	−2	4 3 4
1,832,700	,,	Jan. 13	3	Do.	3 p.c. Deb.	88—90	..	3 6 8
575,000	Stk.	Aug. 31	5⅜	S'th Suburb'n Ord.	5 p.c.	123—126	..	4 7 4
60,000	,,	,,	5	Do.	5 p.c. Pref. .	125—130	..	3 16 11
112,533	,,	Jan. 13	5	Do.	5 p.c. Deb. Stk.	130—135	..	3 14 1
502,310	Stk.	Nov. 11	5	Southampton Ord.	. .	106—109	..	4 11 9
87,950	,,	—	4	Do.	4 p.c. Deb.	—	..	—
120,000	Stk.	Aug. 31	6¼	Tottenham and	A 5 p.c. .	123—128	..	4 17 8
325,520	,,	,,	4½		B 3½ p.c. .	97—102	..	4 13 2
115,000	,,	Dec.* 15	4	Edmonton	4 p.c. Deb.	102—105	..	3 16 2
182,380	10	,,	8	Tuscan, Ltd.	. . . .	8⅞—9½	..	8 13 0
149,900	10	Jan. 3	5	Do.	5 p.c. Deb. Red.	94—96	..	5 4 2
30,000	Stk.	Aug. 31	7½	Wandsworth and	A 5 p.c. . .	160—165	..	4 13 11
255,636	,,	,,	6¼		B 3½ p.c. . .	133—138	..	4 10 7
51,293	,,	,,	5⅝		C 3½ p.c. . .	110—115	..	4 13 6
57,564	,,	Dec. 30	3	Putney	3 p.c. Deb. Stk.	77—82	..	5 13 2
745,872	,,	Aug. 12	5	West Ham	5 p.c. Ord. .	103—105	+1	4 15 3
85,000	,,	,,	5	Do.	5 p.c. Pref. . .	122—127	..	3 18 9
160,000	,,	Dec. 30	4	Do.	4 p.c. Deb. Stk.	101—106	..	3 15 6

Prices marked * are Ex div.

pipes were laid, but not using any water, was unconstitutional as a general tax because it was not graduated by the value of the land, and as a special assessment because it was not graduated by the benefit conferred. But these cases differ from that in hand, first, because the Legislature had not attempted to confer on Jersey City authority to charge against the land the expense of laying water-pipes in front of it; and, secondly, because the city had not fixed the charge to meet such expense. Conditions corresponding to these are necessary to justify such an imposition as that now under consideration.

"There is another view that may be taken, leading to the same result. As already noticed, the statute enabling the city to furnish a water supply directed that, for the expense of laying pipes through the streets, 75 c. per foot should be paid by the owners of adjoining land, and should be a lien on the land until payment. Owners who accepted the benefits of the water supply thus provided should be deemed to have assented to the burdens accompanying it; and thus, even though this assessment could not be imposed on those not receiving the water, it might be legally levied on the property for which the owners did appropriate the supply. The testimony shows that in all the lots now in question the city water had been taken by the owners, not only through the pipes for which this charge is made, but also through those for which these have been substituted."

WATER SUPPLY TO TENEMENT HOUSES.

For some little time the London County Council have been considering the practicability of improving the water supply to tenement houses. Buildings which were originally occupied by one family are now, owing to changed conditions, let out to several families; and in the spring of last year the Public Health Committee brought under the notice of the Council a report by the Medical Officer of Health (Sir Shirley F. Murphy, M.D.) as to the result of an inquiry by Dr. Young respecting the sanitary accommodation in such houses. One of the important facts disclosed in the report was the inadequacy of the arrangements for the supply of water to the tenants of the upper floors; there being in many, if not most, cases, only a single tap, and that in the basement or else on the ground floor. The supply of water to inhabited houses is regulated by the provision of sections 2 and 48 of the Public Health (London) Act, 1891. Section 2 provides that, where there is a constant supply of water, absence from premises of water-fittings shall be a nuisance liable to be dealt with summarily under the Act; while section 48 provides that "an occupied house without a proper and sufficient supply of water shall be a nuisance liable to be dealt with summarily under this Act, and, if it is a dwelling-house, shall be deemed unfit for human habitation." The Committee were doubtful whether these provisions were sufficient to enable sanitary authorities to require a supply of water to the tenants of each floor in tenement houses; and on the 14th of June last the Council decided to promote legislation on the subject. Provision was accordingly made for it in the notice given in November for the Council's General Bill, as mentioned in our columns at the time. The resolution was, however, rescinded on the 6th of December, as the Parliamentary Committee reported that they were advised that it was by no means clear that the present law is insufficient to meet the case, and as the Public Health Committee were endeavouring to get the matter tested at the instance of one of the Metropolitan Borough Councils.

At the meeting of the Council last Tuesday, the Committee reported that on the 16th of December, as the result of proceedings by the Woolwich Borough Council respecting the water supply of a tenement house in High Street, the Magistrate decided that the supply of water from a tap in the yard was not a proper and sufficient supply within the meaning of section 48; and he made an order to abate the nuisance, and ordered the defendant to pay £5 5s. costs. Dr. Hamer, the Council's Assistant Medical Officer of Health, gave evidence supporting that given by the Medical Officer of the Borough Council. The Committee regarded this case as an important one, and they thought the attention of all the Metropolitan Councils should be called to it. They therefore recommended—"That a letter be addressed to the Metropolitan Borough Councils, calling their attention to the decision of the Magistrate at the Woolwich Police Court on Dec. 16, 1904, to the effect that the supply of water from a tap in the yard is not a proper and sufficient supply within the meaning of section 48 of the Public Health (London) Act, 1891, and expressing the Council's hope that they will take all possible steps to secure the provision of a proper and sufficient supply of water for the tenants of every floor of a tenement house." The Council adopted the report, and agreed to the Committee's recommendation.

LEEDS NEW WATER SCHEME.

Work to be Done by Contract.

The Leeds City Council last Wednesday decided, by an overwhelming majority, that the construction of the Colsterdale reservoir shall be done by contract, as recommended by the Water Committee.

The Committee's resolution was greatly objected to by the labour organizations in the city; and a deputation from the Trades' Council, the Labour Representation Committee, and the Building Trades Federation attended before the Council to urge the carrying out of the work by direct employment. Mr. Morley, as the spokesman for the deputation, stated that they believed in direct employment from an economic standpoint, and because the people who would reap the benefits were those who paid a great portion of the money towards the work. The problem of the unemployed could not possibly be left out of the question. It was not proposed, as suggested in some quarters, that the unemployed should be taken *en bloc* to carry out the work; but

FOR RELIABLE

VALVES

OF ALL KINDS FOR GAS-WORKS

SEND YOUR ORDERS DIRECT TO

C. & W. WALKER, Ltd.,

MIDLAND IRON WORKS:
Donnington, near Newport, Salop.

LONDON OFFICE:
110, Cannon Street, E.C.

NEW EDITION of VALVE CATALOGUE SENT on APPLICATION.

he suggested that they would find a fair percentage of men on the unemployed register able to do the necessary unskilled labour on the reservoir. A contractor must necessarily lay aside a certain sum for profits; and the deputation suggested that this amount could be put away by the Corporation for depreciation. If the Corporation decided to let the work by private contract, they would be acting in direct contradiction to the wishes of the ratepayers.

When this part of the business before the Council was reached, the Chairman of the Water Committee (Mr. J. H. Armitage) said he did not wish to deal with the principle as to whether direct municipal administration or letting work by contract was the best method. He would simply consider the question as to whether this particular scheme could be better and more economically carried out by the Corporation or by a contractor. The work referred to would have very little effect on the unemployed problem in Leeds, because in the ranks of the unemployed there were very few men who could do the skilled work necessary. This work was done by navvies who had become practically a class to themselves. No more magnificent set of men, physically, could be found than the English navvy. They went from works to works living under conditions of their own, and acquiring a skill which was not to be found among the ordinary inhabitants of a city like Leeds. A certain number of bricklayers, masons, and blacksmiths might be found employment; but these were not more than 10 per cent. of the number of men required, so that on the question of wages paid, and the number and class of men employed, there would be no difference whether the work was done by the Corporation or by a contractor. It was true that in the past a number of water-works had been carried out by municipalities; but this was because practically the whole of the work in those early days was in the hands of one or two consulting engineers, who favoured direct municipal administration. In later years, however, some very unpalatable facts had been breaking down this tradition; and a great change had come over the opinion of engineers as to how work should be carried out. By doing the work by contract, they obtained two skilled and responsible men at the head of affairs—first, the engineer, who designed the works, drew up the specifications, and saw that the contractor carried out the work efficiently, but who might be a perfect ignoramus in the management of men and handling of plant, &c.; and, secondly, they had the contractor, who had with him a staff experienced in this work, and who were familiar with the management of men, and knew by experience the exact plant that was best suited to the job. If the Corporation undertook the work, they would have to find both of these men, as well as foremen, gangers, book-keepers, &c., and all the plant necessary; and then the work would not be carried out so satisfactorily, because the men would all be strangers to one another, and unused to each other's methods. Where work had been carried out by other corporations, the general result had been an enormous increase in the cost as compared with the estimate, and a very strong opinion had grown up that corporations were making a mistake in doing their own work. Barnsley undertook their own work, which they estimated would cost £170,000. After spending this, they applied for and obtained a further sum of £113,000. Then they went in for a further £15,000; and the work still being unfinished, they had applied for £60,000 more—making in all about £358,000, or nearly double the estimate. Huddersfield had been building their own water-works. They estimated the cost at £150,000 in 1890; but after ten years they were still struggling with the job, and had to go to Parliament for a further £150,000 to complete it. Bradford did theirs by contract, and had experienced no such difficulty. But Leeds had experience of their own. They estimated to spend £55,000, or, with certain extras, £75,000 on the Lindley Wood works; and the actual cost was £119,000, which could only be accounted for by the difference between direct administration and contract work.

An amendment was moved by Alderman Buckle that the work should be done direct by the Corporation, who, he pointed out, had already spent £80,000 in erecting houses, &c., for the men, and had constructed 6½ miles of railway. He said there was no question of finding work for the unemployed, but of doing it in a way that would undoubtedly prove the most economical. If corporations exceeded their estimates, was it quite unheard of for contractors to do the same? Swansea let the contract for their reservoir, and at last had to take the work out of the hands of the contractor and do it themselves; and the total cost, instead of being £270,000, as was estimated, was £430,000. The Glasgow sewerage works were estimated to cost a million. The job was let by contract, and the money was gone when the work was only half finished; while the Clydebank intercepting sewerage works were estimated to cost £119,000, and were done by the city for £78,000. The result of doing the work by direct administration was to get it better performed and to save the contractor's profits.

Mr. T. C. Wilson, who seconded, said that for every case of incapable corporations who failed, there could be found three or more capable corporations who succeeded.

After some further discussion, the amendment was rejected, and the recommendation of the Committee was carried by 42 votes to 8.

It was subsequently agreed to advertise for a Water-Works Engineer, at a salary of £1000 per annum.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The monthly meeting of the Edinburgh and Leith Gas Commissioners was held last Monday, Lord Provost Sir Robert Cranston presiding. The Works Committee reported that, having considered the charge for gas to prepayment meter consumers, they recommended the Commissioners not to reduce it. The Committee took into account that when the price ofgas to ordinary consumers was last raised, no corresponding rise was made to prepayment meter consumers, and

REPUTATION:

Good name; the credit, honour, or character, which is derived from a favourable public opinion.

RICHMOND'S HAVE A WORLD-WIDE **REPUTATION.**

ADVERTISEMENT OF THE RICHMOND GAS STOVE & METER CO., LTD. LONDON: 132, QUEEN VICTORIA STREET, E.C. WORKS & OFFICES: WARRINGTON & STRATFORD

that when the price of gas was last reduced to ordinary consumers, no alteration was made to prepayment meter consumers. They were satisfied that prepayment meter consumers are now charged as nearly as possible the same rate as ordinary meter consumers, taking into account the extra cost of collection, &c., in the case of prepayment meters. The same Committee reported that the Town Clerk of Leith having asked for a plan showing the Commissioners' main pipes which might be affected by the Corporation's electric tramway operations, the Engineer submitted a set of the parliamentary plans, showing the position, &c., of the pipes, and also a letter which he had prepared to be sent to the Town Clerk, pointing out the serious disadvantage of leaving gas-mains under the tramway tracks, which would inevitably some day necessitate stoppage of tramway service in order to permit of the Commissioners having free access to their pipes. The letter suggested that the Leith Corporation should bear half of the estimated cost (£2000) of removing the pipes, the Commissioners to bear the other half. After consideration, the Committee approved, and instructed the Engineer to send off the letter and plans. At a further meeting, they considered a letter from Mr. Pattison asking permission for a chemist to be appointed by his clients to have access to the works, in order to enable him to analyze the gases escaping from the purifiers; and the Sub-Committee instructed that permission be not granted. The Sub-Committee also recommended that negotiations be re-opened for the purchase of Craigleith Quarry, for the purpose of obtaining an independent water supply from it for the Granton Works. The Works Committee approved the report of the Sub-Committee; and at the meeting of the Commissioners, Bailie Bryson moved its adoption. This was agreed to; Sir Andrew M'Donald remarking, with reference to the mains below the tramway tracks in Leith, that the Corporation of Leith would undertake all the risk and the inconvenience. Bailie Bryson said that was so.

The Commissioners then took up consideration of a report by the Stoves Sub-Committee upon the terms of sale to tradesmen of gas appliances. A memorandum by the Engineer, which had been submitted to the Sub-Committee, stated that the trade price list or catalogue price of the various appliances offered for sale by the Commissioners might, for all practical purposes, be said to be a fictitious one: the discounts allowed from the list prices varying considerably in different parts of the country—the practice itself being distinctly different, as between the south of England and Scotland. He had, however, ascertained, on first-class authority, that the discount allowed to traders off list prices in the gas-fitting trade in Scotland was 25 per cent.: off similar goods purchased from English houses, the discounts varied from 33⅓ to 50 per cent. Seeing that they bought very many different classes of goods, often specially to meet consumers' wants, and that the discounts allowed were of a very varying character, he strongly urged that the principle should take the form of a minimum profit on the cost of goods delivered to themselves, and so disregard the list price of the articles. The gas-cooking stove business was one that might be said to be exclusively in the hands of the Commissioners. The conditions of hire, approximating 10 per cent. per annum, and the fact that a hirer becomes the owner of the stove, should he retain the same stove for fifteen years, made it impossible for the gas-stove business to be looked upon as shared in by the traders. The large sizes of grillers and the boiling burners are also used for domestic purposes at a time of the day when it is their earnest wish to increase the consumption of the gas. He was therefore of opinion that those articles should be sold to their customers at such a rate as would ensure their realizing 10 per cent. on the net cost, allowing the trader, should he purchase the goods from them, a discount of 5 per cent. Gas-heating appliances he would propose to deal with as though that class were exclusively a traders' affair—that was to say, that the Commissioners should not sell those appliances at less than an increase of 25 per cent. on the net cost to themselves, and that any trader purchasing such appliances from them, should receive a discount of 15 per cent. off the price charged to an ordinary customer. Gas-fittings were also a branch of the trade with which they had no desire to compete, but merely to show the latest and best appliances in their show-rooms, in order that the public might acquire artistic fittings for gas as well as for electricity. He would therefore propose that in all transactions with reference to these items, the gross addition be 25 per cent. on the net cost to themselves, and that traders should be allowed a discount of 15 per cent. off the price charged to the ordinary customer. These recommendations were adopted by the Sub-Committee, and submitted to the Commissioners. After some discussion, the recommendations were adopted.

A letter from the plumbers and ironmongers Association was submitted, enclosing a resolution to the effect that they regretted the decision of the Commissioners on the subject of municipal trading, and also that no reply had been received to the prayer of their memorial—viz., that a Committee be appointed to confer with the traders, with a view to the preparing of a working arrangement; and that they felt that it was due to the public that an independent investigation should be made into the working of the department, with the view of ascertaining correctly what, if any, profit, was the result of the operations thereon, distinct from the manufacture and sale of gas, and also whether the additional gas consumed in consequence of the use of gas-cookers had effected the reduction in the price of gas claimed for it, more particularly as it was understood that the accounts of the Commissioners for the last financial year showed a considerable adverse balance. Bailie Bryson said they had had this subject before them for a year; and he thought it had had plenty of the time of the Gas Engineer in getting up reports and the like. He moved that they do nothing in the matter. Bailie Douglas seconded. He thought the Commissioners had dealt very well with the traders. Provost Mackie, of Leith, suggested that they should acknowledge the letter, and say that the subject had been considered by the Commissioners, and that they could not reopen it in the meantime. This was agreed to.

A joint meeting of the Gas and Water Committees of the Perth Town Council was held on Thursday to consider the removing of the gas and water pipes from below the tramway track, which is being electrified, to a place of safety. The Gas and Water Managers recommended that the pipes be removed; the cost being estimated at £430.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

London Offices: 19, ABINGDON STREET, WESTMINSTER, S.W.
American Offices: TORONTO. TELEGRAPHIC ADDRESS: "CARBURETED, LONDON."

CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND, IN ADDITION, 6,960,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

The Committees agreed to this being done, and that the cost be charged to the Tramway Committee. The Engineer of the tramway undertaking approves of the work being done.

A new form of lighting, it is reported, is about to be introduced into the Bell Rock Lighthouse. The lighting is to be by means of oil, but is to be upon the incandescent system—colza oil being sprayed on to mantles. It is anticipated that not only will the light be greatly improved, but that there will be a large saving in the quantity of oil consumed.

The Moffat Gas Company, Limited, is the first to start the year with their annual meeting, which was held yesterday. It was reported that there was a balance of profit on the year's working of £587, and that £160 was brought from the previous year, making £747. The Directors recommended payment of dividends at the rate of 2s. 6d. per share on the guaranteed shares, and 15s. per share on the ordinary shares, and that £422 be carried forward. Out of this sum they contemplate enlarging the retort-house. The recommendations were adopted.

The Directors of the Coatbridge Gas Company recommend the payment of the customary dividends of £11 and £7 14s. on the stocks of the Company. They regret their inability at present to reduce the charge for gas, owing to the low prices being obtained for bye-products and residuals. The price at present is 2s. 2d. per 1000 cubic feet.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 4.

Sulphate of Ammonia.

With the covering of January contracts the market assumed a quieter tone, but with an undercurrent of strength which has prevented any set back in prices, though buyers have been endeavouring to get in at a decline. At the close there is more buying going on, and next week may very likely see further developments. Meantime the quotations are £13 to £13 2s. 6d. per ton f.o.b. Hull, £13 3s. 9d. to £13 5s. per ton f.o.b. Liverpool and £13 5s. per ton f.o.b. Leith. Beyond sales at £12 15s. per ton f.o.b. Leith for October, 1905—March, 1906, delivery, no important business has transpired in the forward position, though it is reported that there is second-hand offering of July-December at £12s. 15s. per ton.

Nitrate of Soda.

This article is firm at 11s. 3d. to 11s. 6d. per cwt., according to quality, for prompt, and the same prices would be accepted for spring delivery.

LONDON, *Feb.* 4.

Tar Products.

Business continues quiet, and there is very little doing. There are no fresh transactions to report in benzol; and consumers do not at present appear at all anxious to purchase. There have been one or two inquiries for 90 per cent. for shipment from London; but as makers will not accept less than 10d. per gallon, business has not resulted, as at present it is more favourable to purchase at outports. Fortunately, however, there is very little offering; and therefore there is not likely to be much alteration in value, unless the strike in Westphalia should have any effect upon the supply from the coke-ovens. Toluol and solvent are dull; and prices are, if anything, a little easier. There are reported to be sellers of the latter article at 8½d. per gallon f.o.b. London; but no business appears to have resulted recently. The position of creosote remains the same. There is a little more inquiry for delivery at London; and there do not appear to be so many cheap second-hand parcels offering as was the case a little while ago. In Yorkshire, the price is still maintained at 1¾d. per gallon—in fact, some of the larger makers ask rather over this figure. The weakest market for this article appears to be in Lancashire, as there are certainly sellers at Manchester and Liverpool at lower figures than in any other quarter. Anthracene is reported to be in rather more inquiry from the Continent just at present; but no actual business has resulted, manufacturers not being willing to accept anything like the prices offered by consumers. Carbolic acid is decidedly dull; and there is little or no business to report. For 60's, 2s. has undoubtedly been accepted for early delivery at outports; and London makers would sell at 2s. 1d. Consumers certainly do not at present appear at all interested in the article for forward delivery; and as regards prompt, they are offering rather under 2s. in most cases. There is reported to be a fairly good inquiry for crystals, but at very low prices; and it would seem that there are one or two small second-hand parcels still offering, which tend to depress the value. The demand for pitch still continues good, especially in South Wales, where a fairly steady business is reported, chiefly for early delivery, and consumers appear anxious to secure supplies. The Westphalian strike still continues; but it has not had the anticipated effect on the demand in Belgium. Probably the briquette makers are nervous as to a probable strike among the coal miners in the Charleroi district, which would, of course, render the manufacture of briquettes impossible for the time being. Makers, however, appear fairly well sold; and so far as London is concerned, the principal producers do not seem inclined to reduce their quotations. In Yorkshire, there is very little offering for forward delivery; and in the Midlands the demand continues fairly good. Manchester and Liverpool are undoubtedly the weakest markets; makers in these districts appearing anxious to sell for early delivery, and willing to accept what may be considered fairly low figures.

The average values during the week were: Tar, 18s. to 22s. 6d. Pitch, London, 35s. to 36s.; east coast, 33s. 3d. to 33s. 6d.; west coast, 31s. 9d. to 32s. 3d. Benzol, 90 per cent., 10d.; 50-90 per cent., 8d. Toluol, 7d. to 7¼d. Crude naphtha, 3½d.; solvent naphtha, 8½d. to 9d.; heavy naphtha, 9½d. to 10d. Creosote, London, 1 $\frac{11}{16}$d. to 1⅝d.; North, 1¼d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 2s. Refined naphthalene, £4 to £8; salts, 17s. 6d. to 20s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

PREVENTS NAPHTHALENE DEPOSITS.

OVER **120** MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies and Towns supplied are The Gaslight and Coke Company, The South Metropolitan Gas Company, Birmingham, Leeds, Rochdale, Bristol, Sheffield, Oldham, Dundee, Perth, Dunfermline, and many other Works, both large and small, where they have been working in some instances for the past **Ten Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

Sulphate of Ammonia.

The market has been decidedly quiet during the past week; but prices have been fairly well maintained. As regards Beckton, the Gas-light and Coke Company are still firm at £13 10s., and do not seem at all anxious to sell even at this price. The South Metropolitan Company are still asking £13 15s. on their own terms, but do not report having done any business at this figure. In Leith, a sale was made at the close of the week at £13 6s. 3d. for prompt shipment, which is certainly an improvement; while for forward makers decline to quote. In Hull, business is reported at £13 5s. to £13 6s. 3d. for prompt shipment: and a very good demand seems to prevail. There appears to be a pretty general impression that prices will still further improve next week should the strike in Germany spread to Belgium, as at present seems possible.

COAL TRADE REPORTS.

Lancashire Coal Trade.

On the 1st inst., the prices of all kinds of steam coal were advanced 5d. per ton. This was not entirely unexpected, although it came rather as a surprise from its suddenness. The increase is not due so much to the demand for coal from Germany and other foreign buyers, as to the better home trade, not only in cotton spinning and manufacture but in certain sections of the iron industry. The Westphalian strike does not seem to be settled yet. The disaffected miners, it is reported, have received so much financial help from their co-workers in other States, and even from England, that they are at present in a condition to hold out for some time to come. No doubt Continental and Far East coal requirements exert an influence for good on the English markets; and with present trade prospects prices are likely to be well maintained. Best slack is 7s. 9d. to 8s. 6d. per ton, medium 6s. 6d. to 7s., and common 4s. 6d. to 5s. 3d. For other sorts, prices are hardening.

Northern Coal Trade.

Though the coal trade has been interfered with by the gales, there has been a fair shipment; and with a continued demand for fuel from the German and Dutch ports, the collieries have been working fully, and the prices are still considerably above those that ruled three weeks or so ago. Best Northumbrian steam coals are about 10s. per ton f.o.b., second-class steams are 9s. 3d., and steam smalls 5s. to 5s. 6d. per ton; while unscreened steams are firm generally at 8s. 6d. per ton f.o.b. Gas coals are firm, with a full demand; cargoes having to be sent to the continent, as well as on the more usual demand—the latter being still a very full one. Gas coals vary more in price, the additional demand having driven up the rates. The current quotations vary from about 8s. 6d. to 9s. 6d. per ton f.o.b. for Durham gas coals. One or two small contracts have been settled at prices below these; but much depends on the period over which the delivery is to be made, and on the quantity that is required. Coke is decidedly firmer; but gas coke is dull, except for shipment. Exports of gas coke are still at the price of 13s. per ton f.o.b., but inland producers seem to have heavier stocks, which render prices easier.

Scotch Coal Trade.

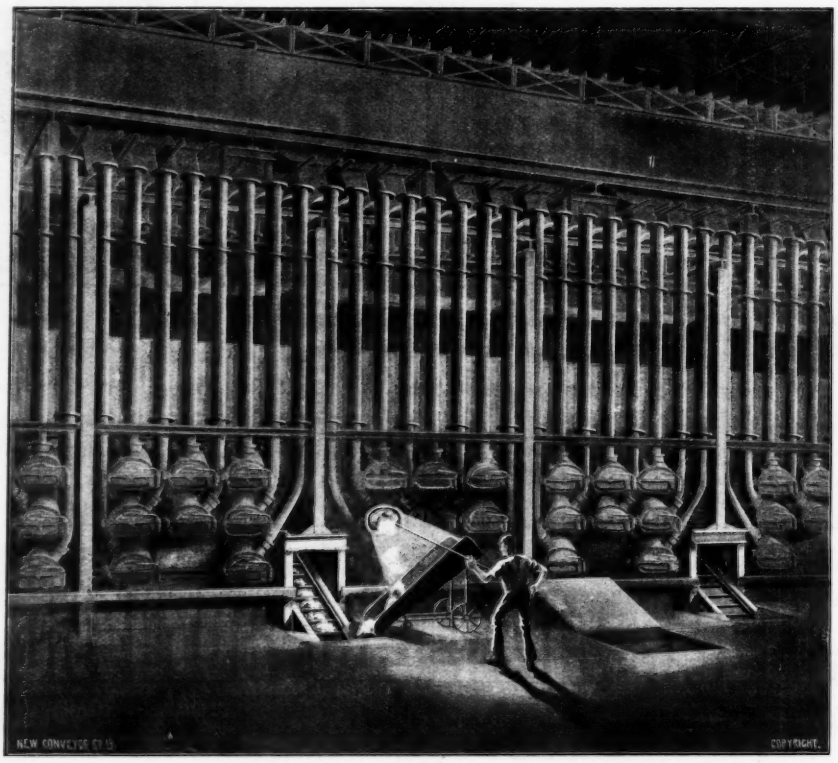
The market is steady, and with every appearance of remaining so. The volume of business being done is also quite satisfactory. The prices quoted are: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 3d. to 9s. 3d., and splint 8s. 9d. to 9s. The shipments for the week amounted to 263,354 tons—an increase upon the preceding week of 55,034 tons, and of 82,586 tons upon the corresponding week of last year. For the year to date, the total shipments have been 705,175 tons—an increase of 23,277 tons upon the same period of last year.

Three Men Suffocated in a Well.—At the new water-works at Long Buckby, last Tuesday, three men were suffocated by foul air at the bottom of a well. Thomas Smith decided to go down the well, which had reached a depth of 243 feet, and he was lowered in the cage; but as he failed to give the usual signal that he was all right, his comrades at the top became alarmed. Walter Bailey and Stephen Atterbury thereupon volunteered to go to the rescue, and were lowered into the well; but they, too, failed to give the signal. Prompt measures were at once taken to clear the well of gas. Pumps and fans were set to work, and after several hours it was found that a candle would keep alight near the bottom. A policeman and a labourer descended, and found the three victims lying together in a few inches of water. Their faces were distorted and discoloured; and there were signs that they had been overcome by the foul air some distance up the shaft, and had fallen from the cage to the bottom of the well.

Water Supply of Colwyn Bay.—In the course of a Local Government Board inquiry last Wednesday week, Mr. William Jones, the Engineer to the Colwyn Bay Urban District Council, described a scheme for supplying water to Upper Colwyn Bay, for which a loan of £5000 is required. He said that the question of furnishing the higher levels of the district with a sufficiency of water had been under the consideration of the Council for seven years; and owing to the rapid development of what was known as Upper Colwyn Bay within the last four years, the matter had been more earnestly brought to their notice. The pumping-station would be in the Pwllycrochan Woods, at a point 300 feet above sea-level. The length of the rising main to the reservoir would be 1466 yards; and it would deliver 8500 gallons per hour. The reservoir would be formed of concrete in two compartments, each of which would be capable of storing 250,000 gallons. This arrangement would facilitate the alternate use and cleaning of the reservoir.

No Drawing Stage.

Perfect Regeneration.



Producer Fed with Hot Coke.

PATENT "DWARF" INCLINED RETORT-BENCH.

NEW CONVEYOR CO., LTD., SMETHWICK.

Pittsburg in Darkness.—A telegram through Laffan's Agency states that, owing to a breakage in the main carrying into Pittsburg the natural gas which is used for heating and lighting, the supply was cut off last Friday, when, to add to the discomfort, the thermometer registered 6° below zero. The suffering entailed was, it is said, intense. Office buildings were compelled to close, and thousands of workmen had to cease work.

Improvements at the Oxford Water-Works.—At the meeting of the Oxford City Council last Wednesday, it was resolved, on the recommendation of the City Engineer (Mr. W. H. White, M.Inst.C.E.), to construct a new filter-bed and pure-water tank, at a cost of £5500; the work to be done by direct labour. These additions will allow of the full utilization of the King's Weir supply, which cannot now be done owing to inadequate storage, &c., at Hincksey.

English Pipes Cheaper than Foreign.—At the recent annual meeting of the Boston Water Company, the Chairman (Mr. W. T. Small) stated that when they were soliciting tenders for the iron pipes necessary for the duplication of a main, English firms were enabled very easily to beat the foreigners out of the market. The price of iron had been abnormally low; and the Company had taken advantage of this fact. The firm selected were able to supply the pipes at about 12s. per ton less than their foreign rivals; and the quality was the very best that could be obtained.

National Gas-Engine Company, Limited.—The report of the Directors of this Company for the year ended the 31st of December shows that the net profit for the year, after deducting an ample sum for depreciation on buildings, tools, &c., and allowing for trade expenses and management salaries, is £32,040. Interim dividends on the preference and ordinary shares have been paid; leaving a balance of £22,282. To this must be added £5722 brought forward; making a total of £28,004 to be dealt with. The Directors propose to pay a final dividend at the rate of 15 per cent. per annum on the ordinary shares, leaving £18,266, of which they purpose placing £15,000 to the reserve fund (making it £50,000), carrying forward £3266.

Another Gas-Works Purchase Scheme Negatived by Ratepayers.—The proposal of the Hessle Urban District Council to promote a Bill for the purchase of the local gas undertaking has met with the same fate as has overtaken a similar scheme at Otley. At Hessle, however, as was recorded in the "JOURNAL," the ratepayers first approved of purchase by a large majority; and it was only on a poll being taken that this verdict was reversed. Other matters were included in the Bill; but each proposal was voted on separately, and all were lost. The part relating to the acquisition of the gas-works was defeated by 260 votes to 223. The register is made up of 961 names; so that only about 50 per cent. of those eligible recorded their votes on the question.

London County Council and the Metropolitan Gas Bills.—At the meeting of the London County Council last Tuesday, the Parliamentary Committee reported that they had been advised that any opposition on the part of the Council to the South Suburban Gas Bill should be undertaken under the provisions of the Municipal Corporations (Borough Funds) Act, 1872; and that notice had accordingly been given by advertisement, in accordance with the Act, that the question of opposing the Bill would be considered by the Council at their meeting to be held on the 14th inst. The Committee pointed out that it would then be necessary to pass a formal resolution to oppose the Bill, and defray the costs and expenses of so doing out of the county fund. The resolution must be passed by an absolute majority of the whole number of the Council; and, subsequently, under section 4 of the Act, the Council will have to obtain the approval of the Local Government Board to the course of action to be taken. The Committee's recommendation to oppose the Bills was agreed to.

Bilston Water Supply.—At the meeting of the Bilston Urban District Council last Wednesday week, the Chairman of the Water and Baths Committee (Mr. J. W. Sankey) said the figures in connection with the water-works undertaking for the past year were extremely favourable. The estimated receipts would be exceeded by £234, and the expenditure would be less than was assumed by about £311; and this year they would come within £58 of paying off their loan charges. They had paid £103 for absolutely new mains, and, in addition, had made a present to the Council, for the use of various departments, of about 7 million gallons of water, which was worth about £175. If this amount had been added to their income, they would have had a good balance on the right side, besides having paid £3211 for loans during the year. They had had uphill work to reach their present position; and the public should know that no longer was the water undertaking a charge upon the ratepayers. He moved the adoption of the Committee's report. Mr. Skemp seconded the motion. He said about three or four years ago councillors were complaining that the water undertaking would take 9d. in the pound out of the rates. It was now, however, practically paying its way. The report was adopted.

Birmingham Gas Department and the Supply of Out-Districts.—At a meeting of the Oldbury District Council on Friday night, the Deputy Clerk (Mr. S. Vernon) reported that, in accordance with instructions from the Council, the Clerk had written to the Birmingham Gas Department pointing out that in 1898 the Birmingham Gas Committee suggested that the Oldbury Council should pay £5000 to Birmingham for the purchase of the rights and power to supply the whole of the parish of Warley with gas. He inquired if the department would refuse to recognize these terms, and urged upon them, if so, to at once make arrangements to meet the needs of the Warley district with regard to the lighting of new streets and buildings, and also to carry out the suggested purchase of the mains laid down by the Oldbury Council in that area, under terms of agreements with the Birmingham Corporation. A letter had been received from Mr. Hampton Barber, the Secretary to the Gas Department, to the effect that the Committee were not prepared to relinquish their rights in regard to the supply of gas at Warley, and further intimating that they would make arrangements which would ensure full compliance with the statutory obligations of the Corporation under the Act. The Chairman said the Council could do nothing more in the matter, as Birmingham had power to supply the district.

PARKINSON'S

GAS-FIRES.

The "HEALTH."

PARKINSON AND W. & B. COWAN, LTD.

(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON.

BELL BARN ROAD, BIRMINGHAM.

Leakage of Gas into Dwelling-Houses.—On the *agenda* for the meeting of the London County Council to-day, there is a motion in the name of Sir W. J. Collins, to refer to the Public Control Committee the consideration of the question of what action shall be taken with a view to the prevention of dangerous leakages from gas-mains into dwelling-houses.

The Gas Suffocation Case at St. Leonards.—At the adjourned inquiry into the circumstances attending the recent death of Ann Noakes at St. Leonards, through inhaling gas which had leaked into her house from a broken main (*ante*, p. 247), the Borough Engineer (Mr. P. H. Palmer) attributed the fracture to the effect of the extreme temperature prevailing between the 15th and 18th of January. In answer to Mr. C. F. Botley, the Assistant-Engineer of the Hastings and St. Leonards Gas Company, he said cold had an effect on iron which it was difficult to understand; and had there been any latent defect in the main, it could not have been detected. The fact that the main had been laid for 18 years, and was in good condition, was corroborative of this. It was a common experience among engineers that iron should be affected by frost. The Corporation and the Gas Company endeavoured to work with each other in connection with the opening of the roads, in order to ensure safety. The Jury returned a verdict of "Accidental death," without attaching blame to anyone personally.

Lighting of Aldwych and Kingsway.—At the meeting of the London County Council to-day, the Improvements Committee will present the following report: "In preparing the estimate of £120,000, approved on Dec. 4, 1900, in respect of works connected with the Holborn to Strand improvement, it was assumed that small gas-standards, similar to those used in other improvements, would be adopted, at a cost of £240, for the lighting of Aldwych and the portion of Kingsway within the City of Westminster. We have to report that arrangements have been made with the Westminster City Council, upon whom the maintenance of the new thoroughfares will eventually devolve, to supply and fix incandescent lamps, with special standards, for the lighting of the thoroughfares. The City Council ask that payment may be made in respect of the works executed. We are of opinion that the amount payable by the Council should be £240, the estimated cost, as stated above, of the provision, &c., of ordinary standards; and the City Council, as the result of negotiation, are prepared to accept this sum. We may add that this settlement is on the lines of a similar agreement for the lighting of the Strand, approved on March 11, 1902. We recommend—'That the payment of £240 to the Council of the City of Westminster in respect of the standards and fittings for the lighting of Aldwych and the portion of Kingsway within the City of Westminster be approved, and that the matter be referred to the Finance Committee to complete.'"

The Kelvedon Gas-Works have been acquired by Mr. Worthington Church, who also owns the Billericay, Southminster, and Swaffham works.

The Municipality of Bedford, Cape Colony, intend to raise a loan of £13,000 to be expended on the improvement of the water supply of the town.

Messrs. Joseph Taylor and Co. have received orders for a solid plate lead saturator for the Woking Gas Company; also for one in connection with the plant to be erected at the Formby Gas-Works.

The Town Council of St. Helens have decided to oppose the Bill in Parliament to authorize the Southport, Birkdale, and West Lancashire Joint Water Board to carry out several water-works, on the ground that the Board propose putting down a well within two miles of the Melling and Kirkby Well of the Corporation, who fear it will drain their water.

To-morrow week, Mr. Atkinson Gibson will carry out the instructions of the Directors of the Sunderland and South Shields Water Company to sell by auction, in accordance with the announcement in our advertisement columns, at the Queen's Hotel, Sunderland, £15,000 (nominal) of additional ordinary stock of the Company, entitled to a maximum dividend of 5 per cent. It is part of the amount of stock authorized by the Company's Act of 1891.

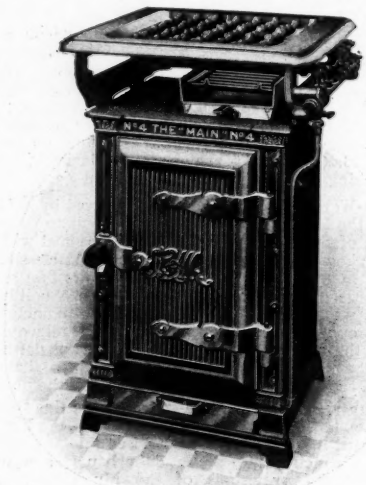
Messrs. Hardy and Padmore, Limited, of the Worcester Foundry, Worcester, have sent us three large sheets of diagrams which they are issuing, showing full-size sections of various kinds of their stock pattern manholes. On the third sheet are given the sizes, the dimensions of the clear opening, and the prices of each manhole, with explanatory and descriptive notes. The firm believe the issue of these sheets will prove a useful departure which will be much appreciated by engineers and others.

The Directors of Drakes Limited report that, notwithstanding severe competition and low prices, a greater volume of business was done during the past year, and, in their opinion, the results of the year's operations may be considered satisfactory. The balance-sheet shows that the net profits were £8821; and £507 was brought forward. After providing for debenture interest, the premium for the redemption of debentures, and the dividend on the preference shares, a distribution of 7 per cent. is proposed on the ordinary shares; leaving £557 to carry forward.

The Lucas light does not need any introduction to the members of the gas profession; its varied forms and its capabilities having been so recently displayed at the Earl's Court Exhibition. At the same time gas managers will find it convenient to have at hand, for ready reference, illustrations and particulars of the light. These will be found in the general catalogue (No. 3) just issued by Moffat's, Limited, which has been very tastefully got up. The catalogue proper is preceded by a few notes directing attention to the special features of the lamps, and is followed by some useful hints relating to fixing, adjusting, and lighting them, as well as keeping them in order. The pamphlet includes illustrations of lamp-columns, globes, chimneys, and shades, and a list of accessories for use with the lamps. Accompanying the catalogue is the firm's illustrated "K" inverted burner list, which shows a great variety of globes, pendants and brackets, and artistic gas-fittings suitable for use with this kind of burner.

The "MAIN"

Gas Cooker



A MODEL

COOKER FOR

HIRING PURPOSES.

R. & A. MAIN, LTD.,

LONDON AND FALKIRK.

Messrs. Robert Dempster and Sons, Limited, have secured the contract for building a complete gas-works for the Kirkby-in-Ashfield Urban District Council. The work has to be carried out under the supervision of Mr. R. G. Shadbolt, of Grantham, the Council's Consulting Engineer.

The Wandsworth Borough Council accepted last Wednesday the tender of Messrs. S. Pontifex and Co. to supply for three years the lamp-columns required outside the South Metropolitan Gas Company's district. The tender of the Gas Company was accepted to supply for one year the columns required in their district.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

CHEMIST. Birmingham Gas Department. Applications by Feb. 20.
GAS MANAGER. Ebbw Vale Company.
CHARGE OF DISTRIBUTING DEPARTMENT. No. 4334.
ASSISTANT DRAUGHTSMAN. Stockport Gas Department. Applications by Feb. 14.
DRAUGHTSMAN. No. 4336.
STOREKEEPER. No. 4337.
WORKS FOREMAN. Birmingham Gas Department. Applications by Feb. 25.
METER REPAIRER. Keighley Gas Department.

Situations Wanted.

GAS ENGINEER. No. 4329.
METER INSPECTOR. No. 4330.

Agency Wanted by Engine Builders. No. 4335.

Exhibition.

ROTHERHAM GAS DEPARTMENT. Application for space by Feb. 15.

Plant, &c., for Sale.

BOILERS. Broadstairs Corporation.
CAST IRON PLATES FOR SCRUBBERS. No. 4338.
ENGINE. Maulden, Saxmundham.

Company Meetings.

BARNET GAS AND WATER COMPANY. Albion Tavern. Feb. 24. 12.30 o'clock.
BRENTFORD GAS COMPANY. Charing Cross Hotel. Feb. 17. 3.30 o'clock.
BROMLEY GAS COMPANY. Bromley. Feb. 21. Six o'clock.
MITCHAM AND WIMBLEDON GAS COMPANY. Offices. Feb. 21. Three o'clock.
NORTH MIDDLESEX GAS COMPANY. Offices. Feb. 22. 3.30 o'clock.
RIDDINGS GAS COMPANY. London Office. Feb. 24. 3.30 o'clock.
SOUTHGATE GAS COMPANY. London Offices. Feb. 16. 3.45 o'clock.

Loans on Mortgage. Derwent Valley Water Board.

Stocks and Shares.

GRAYS GAS COMPANY. Feb. 21.
HARROW AND STANMORE GAS COMPANY. Feb. 21.
NORTH MIDDLESEX GAS COMPANY. Feb. 21.
SUNDERLAND AND SOUTH SHIELDS WATER COMPANY. Feb. 15.

TENDERS FOR

Benzol.

MIDDLETON GAS DEPARTMENT. Tenders by Feb. 18.

Coal and Cannel.

DARWEN GAS DEPARTMENT. Tenders by Feb. 1[illegible].

Condensers.

ASHTON-IN-MAKERFIELD GAS DEPARTMENT. Tenders by Feb. 28.

Cookers.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.

Fire-Clay Goods.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.
BECCLES GAS COMPANY. Tenders by Feb. 21.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 18.
NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.
TIPTON GAS DEPARTMENT. Tenders by Feb. 18.

Gas-Engine.

MAULDEN, Kelsale, Saxmundham.

General Stores, Oil, Iron, Ironmongery, Cement, &c.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 18.
NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.

Governor (Station).

ASHTON-IN-MAKERFIELD GAS DEPARTMENT. Tenders by Feb. 28.

Lanterns, Burners, Pendants, and Mantles, &c.

NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.

Lead and Lead Pipe.

NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.

Lime.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 18.
SALFORD GAS DEPARTMENT. Tenders by Feb. 16.

Meter (Station).

COPENHAGEN LIGHTING DEPARTMENT. Tenders by Feb. 27.

Meters (*Gas and Water).

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 18.
*NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.

Oxide of Iron.

NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.

Pipes (Wrought and Cast), &c.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 18.
NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.
TIPTON GAS DEPARTMENT. Tenders by Feb. 18.
WOKING GAS COMPANY. Tenders by Feb. 11.

Purifiers.

ASHTON-IN-MAKERFIELD GAS DEPARTMENT. Tenders by Feb. 28.

Retort Bench (see also Fire-Clay Goods).

ASHTON IN-MAKERFIELD GAS DEPARTMENT. Tenders by Feb. 28.
SOWERBY BRIDGE GAS DEPARTMENT. Tenders by Feb. 20.

Sulphate Saturator.

BECCLES GAS COMPANY. Tenders by Feb. 21.

Sulphuric Acid.

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.
MIDDLETON GAS DEPARTMENT. Tenders by Feb. 18.
NEWTON-IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.

Tank (Tar and Liquor).

ASHTON-IN-MAKERFIELD GAS DEPARTMENT. Tenders by Feb. 28.

Tar (Coal and Water Gas).

BARROW-IN-FURNESS GAS DEPARTMENT. Tenders by Feb. 21.
MANCHESTER GAS DEPARTMENT. Tenders by Mar. 23.

Valves, Hydrants, Cocks, &c.

NEWTON IN-MAKERFIELD CORPORATION. Tenders by Feb. 25.

Washer-Scrubber.

BECCLES GAS COMPANY. Tenders by Feb. 21.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d. Payable in Advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.
JOHN WM. O'NEILL, Managing Director,
PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

GAS LIQUOR WANTED.
Particulars to MAJOR AND COMPANY, LIMITED, HULL.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd. (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

SPECIAL PAINT FOR GAS-WORKS.
JOHN F. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

OXIDE OF IRON.
(NATURAL.)
BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.
BALE'S FIRE CEMENT, PAINT, AND GAS COAL,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manu-facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

COAL GAS TAR wanted.
BEST PRICES GIVEN.
SHARPNESS CHEMICAL COMPANY, LIMITED, Sharpness Docks, GLOS.

ROBERT DEMPSTER & SONS, Ltd., Contractor for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

AMMONIACAL Liquor wanted. Brotherton and Co., Ltd., Ammonia Distillers. Works: Birmingham, Glasgow, Leeds, Liverpool, and Wakefield.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
Joseph Taylor and Co., Central Plumbing Works, Bolton.
Telegrams: Saturators, Bolton. Telephone 0848.

ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. Padfield and Co., 96 & 98, Leadenhall Street, London, E.C.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
Read Holliday and Sons, Ltd., Huddersfield.

GASHOLDER PAINTING.
PAINTING Work for all kinds of Gas- Works Plant undertaken by contract or otherwise.
Frederick Boyall, 31, Regent's Row, Queen's Road, Dalston, N.E. Established 1850.

BROTHERTON & CO., LIMITED. Offices: Commercial Buildings, Leeds. Correspondence invited.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
Brotherton and Co., Ltd., Chemical Manufacturers. Works: Birmingham, Leeds, and Wakefield.

SPENT OXIDE.
THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "Metrogas, London."

OXIDE OF IRON.
JOHN W. LEITCH & CO., Milnsbridge Chemical Works, Huddersfield, have a quantity for Sale, cheap.
Samples and Price on Application.

GLASS SHADES of every description, for all kinds of Interior **GAS LIGHTING.** Illustrated sheets on application.
JOHN WALSH WALSH,
Soho and Vesta Glass Works, BIRMINGHAM.
Telegrams: "Vesta, Birmingham."
National Telephone: No. 63.
London Show-Room: 4, Holborn Circus, E.C.

OXIDE OF IRON.
WESTBURY OXIDE is now being ex- tensively used for Gas Purification.
For Price and Analysis write to the New Westbury Iron Company, Limited, Westbury, Wilts.

BIGGS, WALL, & CO., 13, Cross Street, Finsbury, E.C. *Telegrams:* "Ragout," London. *Telephone:* 273 Central.
Saturators—See Advt. in last week's issue.
Sulphate Plant—See Advt. in this week's issue.
Charging Machines—See Advt. in next week's issue.

GAS TAR and AMMONIACAL LIQUOR wanted by
George Miller and Co., Tar Distillers, 40, West Nile Street, Glasgow.

COUNTY BOROUGH OF ROTHERHAM.
(Gas Department.)
AN Exhibition of Gas Cooking and Heating Apparatus and other Appliances in connection with Gas Lighting, Motive Power, &c., is intended to be held in the Drill Hall, Rotherham, early in the Spring.
Intending Exhibitors should apply to the undersigned, from whom further Particulars may be obtained, on or before Wednesday, Feb. 15 next.
The Gas Committee do not guarantee Space for every Applicant, and reserve the right of refusal.
Frank A. Winstanley,
Engineer and Manager.

GAS Engineer wishes to recommend Young Man as Meter Inspector, Collector, Timekeeper, &c. Thoroughly trustworthy. Abstainer.
Apply, by letter, to No. 4330, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GAS and Water Works Supplies and Construction Company, Limited, are open to purchase small or large Gas-Works. Constructors for all Gas and Water Work and Main Laying. All Gas and Water Works Plant and Fittings supplied. Gas and Water Works Financed. Shares and Stock accepted in part payment for Work and Materials supplied. Gas and Water Works Shares and Stock Underwritten and Issued.
London Office, 99, Cannon Street, E.C.

GAS Engineer, with over 20 years' Practical Experience, is prepared to accept ENGAGEMENT as Engineer, Manager, or Secretary.
Apply, by letter, to No. 4329, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

ENGINE Builders in the North would be glad to take AGENCY for selling any kind of Machinery to be driven by such Engines, chiefly Large and Medium sizes. A good all-round old established connection, particularly in Scotland and the North of England.
Address No. 4335, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

METER Repairer wanted. State Ex- perience and Wages required.
Apply to the Manager, Gas Offices, Keighley.

DRAUGHTSMAN wanted, at once, thoroughly Experienced in Gasholder Construction Work, capable of Taking out quantities accurately and quickly. Midland district.
Apply, by letter, stating Age, Salary, &c., to No. 4336, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, by a large Suburban Gas Company, a STOREKEEPER. None but those who have had good Experience in Hardware Stores need apply. Commencing wages £2 per week. Age not to exceed 45.
Apply, giving details of Experience, &c., and *copies* of Testimonials, to No. 4337, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANTED, for a large Gas Undertaking, a Capable and well educated Man to TAKE CHARGE of the Distribution Department under the Engineer. None but those thoroughly experienced and fully qualified in Main and Service Laying, Meter and Stove Fixing, &c., need apply. A liberal salary will be given to a suitable man.
Applications, stating Age, Experience, and Salary required, enclosing *copies* only of recent Testimonials and Certificates, to be sent in, not later than the 10th of February, to No. 4334, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

CITY OF BIRMINGHAM.
(Gas Department.)
REQUIRED, Two Works Foremen, Eight hour shifts—viz., 10 p.m. till 6 a.m, and 2 p.m. till 10 p.m., changing over fortnightly.
Applicants must have had a good Mechanical Training, be well acquainted with up-to-date Plant and Machinery, and used to controlling men. Commencing salary £130 per Annum.
References and all Particulars to be sent to the undersigned, City Gas-Works, Saltley, Birmingham, on or before Saturday, Feb. 25.
Henry Hack,
Engineer-in-Chief.

GAS DEPARTMENT, STOCKPORT.
WANTED, an Assistant-Draughtsman accustomed to the Structural Work and Plant of a Gas-Works.
Applications, stating Age, Experience, and Salary required, and enclosing not more than Three *copies* of Testimonials, must be sent, endorsed "Draughtsman," to the Town Clerk, Stockport, not later than Tuesday, Feb. 14 next ensuing.
Canvassing Members of the Council will be deemed a disqualification.
By order,
Robert Hyde,
Town Clerk.
Stockport, Feb. 1, 1905.

CITY OF BIRMINGHAM.
(Gas Department.)
CHEMIST WANTED.
THE Gas Committee of the City of Birmingham require the services of a thoroughly trained CHEMIST, qualified to Take Charge of a new 20-Ton per diem Coal-Testing Plant fitted with Regenerative Retort Settings. Applicants must be capable of undertaking the following duties: The Analysis of Coal and the Bye-Products of Coal; the Analysis of Furnace Gases and the regulating of the Gas Plant; the Manufacture of Gas, including Purification, Analysis, and Test for Illuminating Power and Calorific Value; the Testing of all Materials used in Manufacture, and also the initiation and conduct of Experiment and Research work to aid the scientific development of the industry.
Applicants are required to furnish Particulars of their scholastic attainments in Chemistry, state their Age and Experience, and Salary required, and forward their Application, addressed to the Chairman of the Works Sub-Committee of the Gas Department, Council House, Birmingham, on or before the 20th day of February next.
G. Hampton Barber,
Secretary.
Council House, Birmingham,
January, 1905.

WANTED, a Gas Manager for the Ebbw Vale Company's Gas-Works. Capacity about 6 Million cubic feet per month.
Apply, stating Age, Experience, and Salary required, to the General Manager, Ebbw Vale Steel, Iron, and Coal Company, Limited, Ebbw Vale, Mon.

NEW Gasholder, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. Wright, 181, Queen Victoria Street, London, E.C.

TESTING PLANT FOR SALE—We have several small Sets of GAS APPARATUS, including Retorts, Condensers, Scrubber, Purifiers, Gasholders, overhauled and guaranteed, or New throughout.
Firth Blakeley and Co., Thornhill, Dewsbury.

FOR SALE, in good condition, Cast-Iron Plates for Two Walker Tower Scrubbers, 5 ft. diameter by 38 ft. high, with planed joints. Replaced by larger plant.
Address No. 4338, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

FOR SALE—A Compound Tandem ENGINE, 25-Horse Power, equal to new, and a Cornish BOILER, same power. Both were built in 1897. Reason for selling, replacing by GAS-ENGINE. ESTIMATES for which will be considered.
Address J. & Jas. J. Maulden, Kelsale, Saxmundham.

PURIFIERS, &c., FOR SALE—Sets of 4 ft., 5 ft., 6 ft., 8 ft., 9 ft., 10 ft., 12 ft., 18 ft. squares; also 16 ft. by 12 ft., &c. SCRUBBERS, 8 ft. by 60 ft. 10 inch, 18 inch Square METERS. EXHAUSTERS up to 50,000 feet per hour in Stock. GASHOLDERS and TANKS, also New. State requirements.
Firth Blakeley and Co., Thornhill, Dewsbury.

FOR SALE, by Tender, Two Cornish BOILERS—One 9 ft. by 4 ft., the other 9 ft. by 4 ft. 6 in., both in First-Class condition, with Fittings complete, and are fitted with Meldrum's Patent Furnaces.
Tenders to be delivered by the 1st of March next, to L. A. Skinner, Council Offices, Broadstairs.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters. Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

COUNTY BOROUGH OF SALFORD.
(Gas Department.)
THE Gas Committee invite Tenders for the supply of about 1000 Tons of LIME, required for the Purification of Gas at their respective stations during the Twelve Months from the 1st of April, 1905.
Full Particulars may be obtained on application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Lime," addressed the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 16th of February, 1905.
L. C. Evans,
Town Clerk.
Town Hall, Salford, Feb. 3, 1905.

BOROUGH OF MIDDLETON.
THE Corporation of Middleton are pre- pared to receive TENDERS for SUNDRY STORES for the Gas-Works (Meters, Tubes and Fittings, Fire-Clay Goods, Oils, Lime, Vitriol, Benzol).
Further Particulars and Form of Tender from Mr. E. E. J. Anderson, M.I.M.E., Gas Engineer.
Tenders, addressed to the Chairman of the Gas Committee, endorsed "Tender for Sundry Stores," are to be delivered at my Office on or before Saturday, the 18th of February, 1905.
The Corporation do not bind themselves to accept the lowest or any Tender.
All Persons or Firms Tendering for these Goods must pay their workpeople the Standard or Trade Union Rate of Wages at least, and observe the trade conditions which attach to the various kinds of work for which a Tender is sent in.
Frederick Entwistle,
Town Clerk.
Town Hall, Middleton,
Jan. 30, 1905.

ASHTON-IN-MAKERFIELD URBAN DISTRICT COUNCIL.
TO GAS PLANT MANUFACTURERS.
THE Council are prepared to receive TENDERS for the following GAS PLANT:—
Contract No. 1.—New BENCH of three arches of Eight Retorts each. Regenerative Settings.
Contract No. 2.—A Set of ANNULAR CONDENSERS, capacity 300,000 feet per day.
Contract No. 3.—An overhead steel TAR and LIQUOR TANK.
Contract No. 4.—Two Oxide PURIFIERS.
Contract No. 5.—STATION GOVERNOR.
Plans may be seen, and Specifications may be obtained, at the Gas-Works, Ashton-in-Makerfield, on application to the Engineer and Manager, Mr. H. Niven.
Sealed Tenders, endorsed "Gas Plant," to be sent so as to reach me not later than the 28th of February, 1905.
The lowest or any Tender not necessarily accepted.
Albert Sykes,
Clerk to the Council.
Council Offices: Ashton-in-Makerfield,
Jan. 25, 1905.

WOKING DISTRICT GAS COMPANY.

TENDERS are invited for the supply of 400 10-inch Cast-Iron SOCKET and SPIGOT PIPES, and sundry CONNECTIONS.

Specification and full Particulars may be obtained from Messrs. W. A. Valon and Son, 140, Temple Chambers, London, E.C.

The Directors do not bind themselves to accept the lowest or any Tender.

Tenders to be sent in, endorsed "Tender for Pipes," on or before Saturday, the 11th inst. addressed to the undersigned.

B. DENNETT HOLROYD,
Secretary.

5 & 6, Great Winchester Street, E.C.

BOROUGH OF BARROW-IN-FURNESS.

THE Corporation are prepared to receive TENDERS for the purchase of the surplus GAS TAR and OIL-GAS TAR produced at their Gas-Works from the 1st day of April next to the 31st day of March, 1906, delivered into the Purchaser's Tank-Waggons and Barrels at the Gas-Works Siding.

Any further Information may be had on application to the Manager of the Gas-Works.

Sealed Tenders, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Tar," to be delivered at the Town Clerk's Office, on or before Tuesday, the 21st day of February, 1905.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness.

BOROUGH OF BARROW-IN-FURNESS.

THE Corporation are prepared to receive TENDERS for the supply of Machine-Moulded FIRE-CLAY RETORTS, FIRE-BRICKS, CAST-IRON PIPES, WROUGHT-IRON TUBES and FITTINGS, BRASS COCKS, GAS-METERS, GAS-COOKERS, OIL, LIME, IRONMONGERY, and SULPHURIC ACID as may be required from the 1st day of April next to the 31st day of March, 1906.

Sealed Tenders, on Forms to be obtained at the Office of the Manager of the Gas and Water-Works, addressed to the Chairman of the Gas and Water Committee, and endorsed "Tender for Stores," to be delivered at the Town Clerk's Office on or before Tuesday, the 21st of February, 1905.

The lowest or any Tender not necessarily accepted.

By order,
C. F. PRESTON,
Town Clerk.

Town Hall, Barrow-in-Furness.

TIPTON URBAN DISTRICT COUNCIL.

(GAS DEPARTMENT.)

TENDERS FOR FIRE-CLAY GOODS AND TUBES.

THE Gas Committee invite Tenders for the supply of—

(*a*) FIRE-CLAY GOODS,

(*b*) WROUGHT-IRON TUBES AND FITTINGS,

which may be required during the ensuing Twelve Months.

Forms of Tender for Fire-Clay Goods and any further Particulars can be obtained on application to the undersigned.

No Tender Forms are issued for Tubes.

Tenders, endorsed "Tender for Fire-Clay Goods" and "Tender for Tubes" respectively, to be addressed to the Chairman of the Gas Committee, Gas-Works, Tipton, on or before February 18, 1905.

SIDNEY O. STEPHENSON,
Engineer and Manager.

Gas-Works, Tipton,
Feb. 1, 1905.

MANCHESTER CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the purchase and removal, on the sliding-scale basis, of the COAL-GAS TAR to be produced at their Gaythorn, Rochdale Road, and Bradford Road Stations respectively during a period of One, Two, or Three Years, commencing at noon on the 31st of March, 1905.

The Committee reserve the right to divide the Tenders as they may consider advisable.

Sealed Tenders, addressed to the Chairman of the Gas Committee and endorsed "Tender for Coal-Gas Tar," must be delivered at the Offices of the Gas Department, Town Hall, on or before Ten a.m. on Thursday, the 23rd day of March, 1905.

Full Particulars and Forms of Tender may be obtained on application in writing to Mr. Charles Nickson, Superintendent of the Gas Department.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
Jan. 27, 1905.

MANCHESTER CORPORATION GAS-WORKS.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the purchase and removal of the TAR to be produced by the Carburetted Water-Gas Plant at their Bradford Road Station during One, Two, or Three Years, commencing at noon on the 31st of March, 1905.

The Committee do not bind themselves to accept the highest or any Tender.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Carburetted Water-Gas Tar," must be delivered at the Offices of the Gas Department on or before Ten a.m. on Thursday, the 23rd day of March, 1905.

Full Particulars and Form of Tender may be obtained on application in writing to Mr. Charles Nickson, Superintendent of the Gas Department.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
Jan. 27, 1905.

STATION GAS-METER.

THE Lighting Department of the Corporation of Copenhagen invite TENDERS for the supply and erection of a GAS-METER of a capacity of 200,000 cubic feet per hour. Full Particulars and Conditions of Contract may be obtained on application to the Valby Gas-Works, Valbys, Copenhagen.

Tenders, accompanied by the said Conditions, &c., to be delivered to the Director of the Lighting Department, 22, Vestre Boulevard, Copenhagen, not later than Feb. 27, noon.

The Department will not be bound to accept the lowest or any Tender.

THE LIGHTING DEPARTMENT OF COPENHAGEN.
Jan. 28, 1905.

THE Directors of the Beccles Gas Company are prepared to receive TENDERS for the following GAS PLANT:

CONTRACT No. 1.—Two beds of Six RETORTS, with MOUTHPIECES, on the Regenerative System.

CONTRACT No. 2.—Solid-Plate SATURATOR for half ton to one ton of Salt per day.

CONTRACT No. 3.—WASHER-SCRUBBER to pass 200,000 cubic feet per day, with Bye-Pass and 9-inch Connections.

Plans may be seen and Specifications may be obtained on application to the Engineer and Manager.

The Directors do not bind themselves to accept the lowest Tender.

Tenders to be addressed to me not later than Feb. 21.

W. METHVEN,
Engineer and Manager.

Beccles, Feb. 2, 1905.

BOROUGH OF DARWEN.

TENDERS FOR GAS SLACK AND NUTS.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply of GAS SLACK and NUTS, for One Year, to be delivered at the Gas-Works Siding in Corporation Waggons.

Forms of Tender and all Information as to Quantities may be obtained on application to Mr. A. H. Smith, Gas Engineer, Darwen.

Sealed Tenders, endorsed "Gas Slack," must be delivered to the undersigned not later than Wednesday, Feb. 15, 1905.

No Tender necessarily accepted.

By order,
W. P. HALLIWELL,
Town Clerk.

Town Clerk's Office,
Darwen, Jan. 31, 1905.

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.

TENDERS FOR RETORT-BENCH.

THE Gas Committee invite Tenders for the following Work to be done at their Luddenden Foot Gas-Works:—

Pulling down existing Retort-Bench in sections, and for the supply and erection on the Regenerator System of Six SETTINGS of Six RETORTS, with all Furnace Fittings, Retort Mountings, Foundations, Subways, &c., complete.

On receipt of £1 1s. (which will be returned for *bona-fide* Tenders), Specification and Forms of Tender and any other Information required can be obtained from the Engineer, Mr. A. W. Bissell, Gas-Works, Sowerby Bridge.

The Council do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, endorsed "Retort-Bench," to be received by the undersigned not later than Twelve o'clock noon on Monday, Feb. 20, 1905.

R. W. EVANS,
Solicitor and Clerk to the Council.

Commercial Bank Chambers,
Halifax.

URBAN DISTRICT OF NEWTON-IN-MAKERFIELD.

TENDERS FOR SUPPLIES.

NOTICE is Hereby Given, that the Urban District Council of the above-named district are prepared to receive TENDERS from persons willing to Contract for the supply of the following MATERIALS for One Year, commencing the 1st of April, 1905—viz.:

1, 2, and 3.—Wrought-Iron Steam Tubes and Fittings.

4.—Main Cocks, Ferrules, Plug Stop Cocks, Ingot Tin, Pig Lead, Lead Gas and Water Pipe, Yard Brushes and Shovels.

5.—Round, Flat, Square, and Sheet Iron.

6.—Oxide of Iron, Brown Vitriol, Disinfecting Powder and Fluid, Oil, Rubber Pump Valves and Joint Rings.

7.—Incandescent Burners and Mantles, Gas-Burners, Street Lanterns, Rubber Tubing, Pattresses, Pendants, and Brackets.

8, and 9.—Cast-Iron Main Pipes, Special Pipes and Castings, Sluice-Valves, Water-Meters, Cast-Iron Hydrant, Valve, Meter, and Stop Tap Boxes.

10.—Ordinary and Prepayment Gas-Meters.

11.—Retorts, Fire-Bricks, Fire-Clay, Buxton Lime, and Portland Cement.

12.—Hay, Straw, and Provender for Horses.

To be delivered free of expense within the District.

Printed Forms of Tender may be obtained from the Stores Clerk, Gas-Works, Earlestown, between the hours of nine and five, Saturdays nine and Twelve.

No Tender will be considered unless made strictly in accordance with, and on one of, the printed Forms issued, and the same must be sealed and delivered to me at the Town Hall, Earlestown, before Twelve o'clock noon on Saturday, the 25th of February, 1905, after which no Tender will be received.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
C. COLE,
Clerk to the Council.

Town Hall, Earlestown,
Lancashire, Feb. 3, 1905.

BRENTFORD GAS COMPANY.

NOTICE is Hereby Given, that a HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Charing Cross Hotel, London, on Friday, the 17th of February inst., at Half-past Two o'clock precisely, to transact the usual Business, including the declaration of a Dividend for the Half Year ended the 31st day of December last, and to elect Directors and Auditors in the place of those who will at such Meeting go out of Office, in compliance with the Company's Acts of Parliament.

By order,
WILLIAM MANN,
Secretary.

Office, Brentford,
Feb. 1, 1905.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Chief Offices, 639, High Road, Tottenham, on Saturday, the 18th day of February next, at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 31st of December, 1904, to declare Dividends, and to transact General Business.

The TRANSFER BOOKS for the CONSOLIDATED "A" and "B" STOCKS WILL BE CLOSED from Friday the 3rd to Monday the 20th of February, both days inclusive.

By order of the Board,
JAMES RANDALL,
Secretary.

Chief Offices of the Company:
639, High Road, Tottenham,
Jan. 27, 1905.

NORTH MIDDLESEX GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors will be held at the Company's Offices, No. 5, Great Winchester Street, Old Broad Street, London, E.C., on Wednesday, the 22nd day of February inst., at Half-past Three o'clock p.m., to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 31st of December, 1904, to declare Dividends, to elect a Director, to appoint an Auditor, and for other purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 9th to the 22nd of February, both days inclusive.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Office: 5, Great Winchester Street,
Old Broad Street, London, E.C., Feb. 2, 1905.

BROMLEY GAS CONSUMERS' COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the "Bell" Hotel, Bromley, Kent, on Tuesday, the 21st day of February, 1905, at Six o'clock p.m. precisely, to receive the Report of the Directors, with the Balance-Sheet certified by the Auditors, to declare a Dividend, to elect Three Directors and an Auditor on retirements by rotation, and to transact generally the business of a General Meeting.

The TRANSFER BOOKS WILL BE CLOSED from the 4th of February, to the 21st of February, both days inclusive.

By order of the Board,
HENRY W. AMOS,
Secretary.

Offices: 156, High Street,
Bromley, Kent, Feb. 4, 1905.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Albion Tavern, Aldersgate Street, in the City of London, on Friday, the 24th day of February, 1905, at Half-past Twelve o'clock in the afternoon precisely, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st day of December last, to declare a Dividend, to elect Directors and an Auditor in the place of those retiring by rotation, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 11th to the 24th of February, both inclusive.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 30, Gracechurch Street,
London, Feb. 3, 1905.

MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

(INCORPORATED BY ACT OF PARLIAMENT, 1867.)

NOTICE is Hereby Given, that the SEVENTY-SIXTH ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held in the Board Room, at the Works, Mitcham, in the County of Surrey, on Tuesday, the 21st day of February, 1905, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and a Statement of the Accounts for the Half Year ended the 31st day of December last, to declare a Dividend, to elect Directors and an Auditor in place of those retiring by rotation, and for General Business.

The TRANSFER BOOKS WILL BE CLOSED from the 6th inst. until after the Meeting.

By order,
BENJAMIN GREEN,
Secretary and Manager.

Offices and Works: Western Road,
Mitcham, Jan. 24, 1905.

RIDDINGS DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Shareholders of the above Company will be held at the Offices of the Company, No. 30, Gracechurch Street, in the City of London, on Friday, the 24th day of February, 1905, at Half-past Three o'clock in the afternoon, to receive the Report of the Directors and the Accounts for the Half Year ended the 31st day of December last, to declare a Dividend, to elect a Director and an Auditor, and to transact the General Business of the Company.

The TRANSFER BOOKS WILL BE CLOSED from the 11th to the 24th inst., both inclusive.

By order of the Board,
ERNEST W. DREW,
Secretary.

Offices: 30, Gracechurch Street,
London, Feb 6, 1905.

SOUTHGATE AND DISTRICT GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, 5, Great Winchester Street, Old Broad Street, London, E.C., on Thursday, the 16th day of February prox., at 3.45 o'clock p.m. precisely, to receive the report of the Directors and the Accounts of the Company for the Half Year ended the 31st of December, 1904, to declare Dividends, to elect two Directors, to appoint an Auditor, and for other purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 3rd to the 16th of February, both days inclusive.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Office, 5, Great Winchester Street,
Old Broad Street, London, E.C., Jan. 31, 1905.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
GRAYS GAS COMPANY, LIMITED.

NEW ISSUE OF 400 £10 "B" SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Feb. 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HARROW AND STANMORE GAS COMPANY.

NEW ISSUE OF 500 £10 "C" SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Feb. 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
NORTH MIDDLESEX GAS COMPANY.

NEW ISSUE OF 300 £10 ORDINARY SHARES, AND £2000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Tuesday, Feb. 21, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THE Derwent Valley Water is Board prepared to receive a limited amount of money upon Mortgage at £3¾ per cent. per annum either for a term of years, not exceeding seven, or repayable at six months' notice from either party.

The Derwent Valley Water Board was constituted by Parliament in 1899 to supply water to the towns of Derby, Leicester, Nottingham, and Sheffield, and the monies required for carrying out the necessary Works are, by the powers of the Derwent Valley Water Acts 1899 to 1904, secured upon the Revenues and Rates of the said Towns in due proportion.

Applications to be sent to Mr. W. Gill Hodgson, Accountant to the Board, Bamford, via Sheffield.

By order,
O. B. STEWARD,
Clerk to the Board.

Now Ready. Price 5s. 6d. Post Free.

REPORTS OF DISTRICT GAS ASSOCIATIONS FOR 1904.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

SUNDERLAND AND SOUTH SHIELDS WATER COMPANY.

IMPORTANT SALE OF WATER STOCK.

TO BE SOLD by Auction, in the Long Room of the Queen's Hotel, Fawcett Street, Sunderland, on Wednesday, the 15th of February, 1905, at Two o'clock in the afternoon prompt.

MR. ATKINSON GIBSON, AUCTIONEER,

£15,000

(Nominal) of ADDITIONAL ORDINARY CAPITAL STOCK,

(Maximum Dividend 5 per cent.) authorized to be created and issued under the powers contained in the Sunderland and South Shields Water Act, 1891.

The above Stock will be entitled to Dividend from the 1st day of January, 1905, and be registered in the name of the Purchaser free of charge.

A deposit of 10 per cent. will be required at the time of Sale; the remainder to be paid on or before the 1st day of March, 1905.

ALEXANDER CAMERON,

GAS AND CANNEL COAL MERCHANT,

48, WEST REGENT STREET,

GLASGOW.

THOMAS DUXBURY & CO.,

16, DEANSGATE, MANCHESTER,

Gas Engineers' Agents and Contractors for METERS, FIRE-CLAY GOODS, OXIDE OF IRON, AND ALL OTHER GAS APPARATUS.

Inquiries Solicited.

Telegrams: "DARWINIAN, MANCHESTER."
Telephone 1806.

THE

"ROTARY"

STATION METER.

Efficiency Demonstrated.

APPLY—

T. G. MARSH,

MAWSON CHAMBERS, DEANSGATE, MANCHESTER.

RAILS.

New and Second-Hand with all Accessories; also Tip Waggons and Turntables.

B. M. RENTON,

MIDLAND WORKS,

SHEFFIELD.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET, E.C.

Demy 4to. Limp Cloth. Price 7s. 6d. (Post Free).

THE FLOW OF GASES and PROPORTIONING GAS MAINS.

Four Diagrams (with explanatory pamphlet) for determining at a glance the various Problems involved in Proportioning Gas Mains and Services to suit the varying conditions of Diameter, Length, Pressure, Specific Gravity, and Discharge, with Notes as to allowances to be made for Bends, Branch Mains, and other Disturbion Influences.

By

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

LONDON:
WALTER KING, 11, Bolt Court, Fleet Street, E.C.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,

CHESTERFIELD.

PATENT RECUPERATIVE

INCANDESCENT GAS LAMP.

The only Lamp with absolutely **DUST AND INSECT PROOF BURNER.**

MANY DETAIL IMPROVEMENTS.

This Burner being positively Dust and Draught Proof, it prolongs the life of the Mantle and Saves its Cost in Maintenance.

See Testimonials.

THE POPULAR LAMP.

6.A. Fig. 6. Enamelled White Case and Flat Opal Reflector or Crimped Opal.

A. E. PODMORE & CO.,

Patentees and Manufacturers,

33, Charles St., Hatton Garden, E.C.

Telephone 6600 Central. Telegrams: "PROMEROPE."

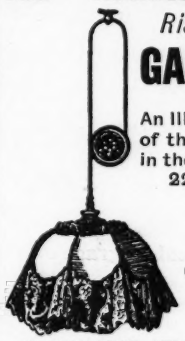
TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE LIMITED,
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD STREET, E.C.

Gas Companies are solicited to try Samples of the
MIRFIELD GAS COAL
UNEQUALLED.
Sperm Value 878·85 lbs. per Ton.
Prices and Analysis on application.
The MIRFIELD (GAS-COAL) COLLIERIES CO.,
RAVENSTHORPE, NEAR DEWSBURY.

ARMSTRONG'S
PATENT
CANDLE SAFETY LAMPS.
Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.
48, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

THE "HANWELL" PATENT
Rising and Falling
GAS PENDANT.

An Illustrated Description of this Pendant appeared in the "Journal" for Nov. 22, 1904 (page 599).
Write for full Particulars to the
"HANWELL" Pendant Company,
96, ABINGTON STREET, NORTHAMPTON.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.
For Particulars, Price, &c., apply to Mr. EDWARD PRICE, "Langley," Wyke Avenue, WORTHING.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts, and Covers, and rendering Leakage impossible.

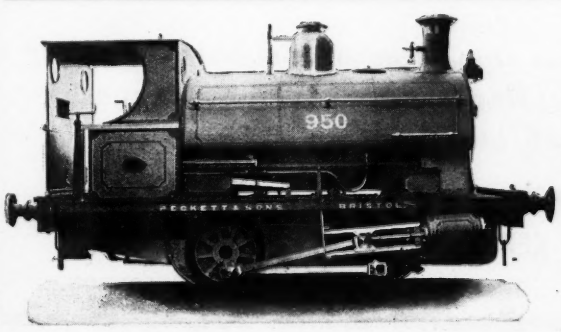
The "Wis" High Power Lamp for indoor and outdoor. Reasonable and Reliable.

The "Pond" Patent Arc Lamp is a new and beautiful design. All copper.

Pond & Co., Specialists in Public Lighting, Patentees, Contractors, and Brass Founders, Farringdon St., and Farringdon Avenue, London, E.C.

The "Gale-proof" Patent Street Lantern is absolutely wind-proof. A marked success.

The "Wis" Mantle is warranted to "stand up and hold tight." Radiant and Reliable.



LOCOMOTIVES
LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in Stock, ready for immediate delivery.
Photographs, Specifications, and Prices on Application.
PECKETT & SONS, Atlas Locomotive Works, **BRISTOL.**
Telegraphic Address: "PECKETT, BRISTOL."

G. 27,604.

ART METAL WORK.

The illustration shows a unique example of an inverted pendant arranged whereby the products of combustion are prevented from reaching the ornamental part of the fitting, while the shadow on the ceiling common to deflector pendants is broken up.

Typical in grace of design of our stock of high-class fixtures.

Complete catalogue (No. 206) post free on application.

Falk, Stadelmann, & Co., Ltd.,

83, 85, & 87, Farringdon Road, London, E.C.

Wrought-Iron

TUBES

And Fittings & Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM.

BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., LTD., 91 & 93, SOUTHWARK ST., S.E.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

MIDLAND AND WEST OF ENGLAND DISTRICT OFFICE: *6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.*
Telegraphic Address "WIGAN, BIRMINGHAM." Telephone No. 200.

LONDON DISTRICT OFFICE: *6, STRAND, LONDON—C. PARKER & SON, Sole Agents.*
Telegraphic Address: "Parker London."

COAL TAR PRODUCTS.

Benzol, Toluol, Solvent Naphtha, Creosote Oils, Grease Oils, Carbolic Acid, Crude Creosote Salts, Granulated (Crude) Naphthalene, Sublimed Naphthalene, Anthracene, Refined Tar, Pitch, also Sulphate of Ammonia.

For Prices apply to the **SOUTH METROPOLITAN GAS COMPANY,**

Works: ORDNANCE WHARF, EAST GREENWICH, LONDON, S.E.

709, OLD KENT ROAD, LONDON, S.E.

Telegraphic Address: "METROGAS, LONDON."

WILSON CARTER & PEARSON
LIMITED,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas and Other Purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

You owe it to your business to write to us and find out

The Remington

method of Business-Building.

Write and—

Get the Idea!

Remington Typewriter Company,
100, Gracechurch Street, E.C.,
And all large Towns.

FOR OUTDOOR LIGHTING
— USE —
THE PATENT
'RUBY'
GAS MANTLES.
UNRIVALLED IN DURABILITY.
UNIQUE IN QUALITY.
CHEAP IN PRICE.

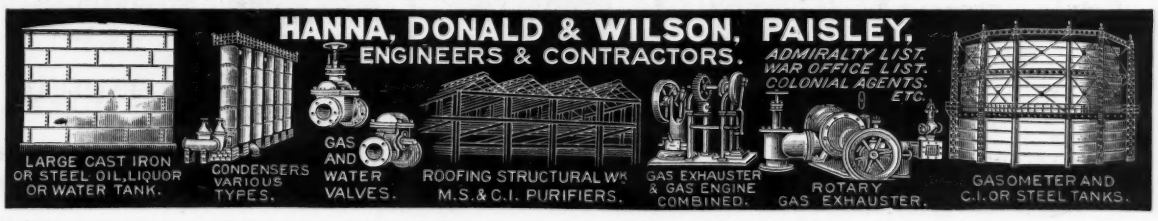
SOLE AGENTS—
THE
"Ruby" Incandescent Gas-Light Co.,
11, Queen Victoria Street, LONDON, E.C.

CASES FOR BINDING
QUARTERLY
VOLUMES OF THE "JOURNAL"
PRICE 2s. *EACH.*

THE THAMES BANK IRON CO.
UPPER GROUND STREET, LONDON, S.E.
SUPPLY FROM STOCK
CAST-IRON RETORTS
AND ALL KINDS OF GAS-WORKS APPARATUS.
SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.
Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**
AGENTS FOR
ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

GEORGE WILSON, COVENTRY,
Wet and Dry Gas Meter Manufacturer.
PREPAYMENT METERS for Pennies, Shillings, or any other Co'n.

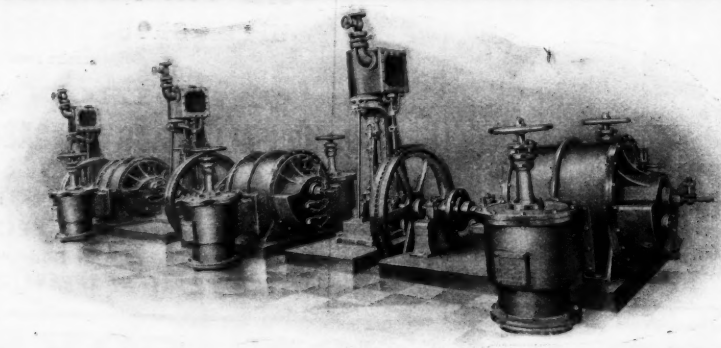
HANNA, DONALD & WILSON, PAISLEY,
ENGINEERS & CONTRACTORS.
ADMIRALTY LIST. WAR OFFICE LIST. COLONIAL AGENTS. ETC.


LARGE CAST IRON OR STEEL OIL, LIQUOR OR WATER TANK.
CONDENSERS VARIOUS TYPES.
GAS AND WATER VALVES.
ROOFING STRUCTURAL WK M.S.& C.I. PURIFIERS.
GAS EXHAUSTER & GAS ENGINE COMBINED.
ROTARY GAS EXHAUSTER.
GASOMETER AND C.I. OR STEEL TANKS.

The Book of the Moment

If you haven't had a Copy, see that you get one.

R. LAIDLAW & SON,
LIMITED
GAS & WATER ENGINEERS.



THREE SETS OF VERTICAL STEAM ENGINE & EXHAUSTER TOTAL CAPACITY 210 000 CUB. FT. OF GAS PER HOUR AT 60 REVS PER MINUTE SUPPLIED & ERECTED AT PORTSEA GAS WORKS.

SIMON SQUARE · WORKS · EDINBURGH

6 LITTLE BUSH · LANE · LONDON, E.C.

ALLIANCE FOUNDRY & ENGINEERING WORKS. GLASGOW.

THE LEEDS FIRECLAY CO., LTD.,

CLIFF'S BRAND.
INGHAM'S BRAND.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

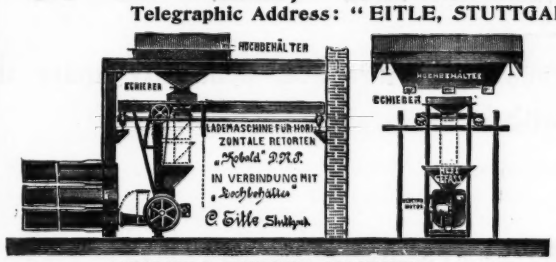
Patent MACHINE-MADE RETORTS

These Patent Machine-Made Retorts possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made. *Retorts carefully Packed for Export.*

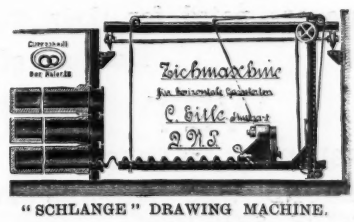
LONDON: 2 & 3, NORFOLK STREET, STRAND, W.C.
LEEDS: 20, Park Row. LIVERPOOL: 21, Leeds Street.

C. EITLE, ENGINEERING WORKS, STUTTGART.

Telegraphic Address: "EITLE, STUTTGART." Telephone: No. 635.



"KOBOLD" CHARGING APPARATUS.



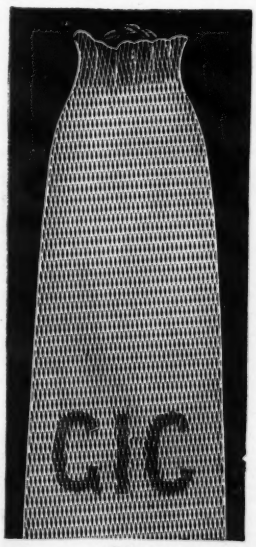
"SCHLANGE" DRAWING MACHINE.

ADVANTAGES OF THE "KOBOLD" CHARGING APPARATUS.

1.—The simplest of all existing Charging Machines, as in charging there is only ONE shaft working.
2.—Almost indestructible in construction, as there are no combustible parts exposed to the heat of the Retorts.
3.—Uniform bed of coal of any desired height in the retort, and consequently any desired weight of charge may be inserted.
4.—Greater yield of gas in comparison with all other types, owing to the coal being deposited in the retort most advantageously.
5.—Least inrush of cold air owing to the close fit of the charging mouthpiece with the retort mouthpiece, with consequently practically no cooling of the retort, the least outrush of flame and smoke, and therefore smallest loss of gas.
6.—Smallest consumption of power.
7.—Most rapid working, as the complete charging of a retort requires only two pulls of a lever.
8.—May be set at any position in regard to height by either manual or motor power.
9.—Lowest cost to purchase; paying interest and redemption in about three years.

ADVANTAGES OF THE "SCHLANGE" DRAWING MACHINE.

1.—The simplest and best drawing machine in the world for horizontal retorts.
2.—Least time required to draw a retort (10-15 seconds).
3.—Most careful treatment of the lumps of coke, as well as the retort.
4.—Smallest consumption of power.
5.—Lowest cost to purchase.
6.—Most substantial construction, and consequently very low maintenance charges.
7.—Rapid and cheap working, consequently pays interest and redemption in a few years.



NINETEEN 0 FIVE

REDUCE YOUR MAINTENANCE BILLS.

AN UNPRECEDENTED OFFER, FOR ONE MONTH ONLY.

We will send Carriage Paid to any **GAS COMPANY** or **LIGHTING AUTHORITY** in **GREAT BRITAIN** a trial gross of pure Ramie **"C"** Mantles, guaranteed first quality, at **24s.** net.

(Mantles are unstamped and in plain boxes).

We will also at the same time send **ESPECIALLY LOW QUOTATIONS FOR 7, 14, 21, & 100 GROSS LOTS.**

N.B.—We cannot give free Samples of this Mantle, and the supply is limited.

PLEASE WRITE AT ONCE TO

The GENERAL INCANDESCENT COMPANY, Ltd.,

Telegrams: "ASABLAZO, LONDON." **CITY ROAD, FINSBURY, LONDON, E.C.** Telephone: No. 9536 London Wall.

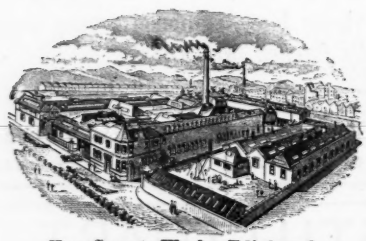
Established 1850.

ALDER & MACKAY,

MANUFACTURERS OF

WET AND DRY GAS-METERS

Combining all the Latest Improvements.



New Grange Works, Edinburgh.

DRY METERS.

DRY METERS IN BEST TINNED-PLATE CASES.

DRY METERS IN CAST-IRON CASES.

(We are the Original Designers and Makers of Cast-Iron Dry Meters.)

DRY PREPAYMENT METERS ARRANGED EITHER FOR PENNIES OR SHILLINGS.

DRY EXPERIMENTAL AND TEST METERS.

Our Meters are noted for their Rigid Exactitude of Measurement, Reliability under the Extremes of Working, with Great Durability.

WET METERS.

WET CONSUMERS' METERS.

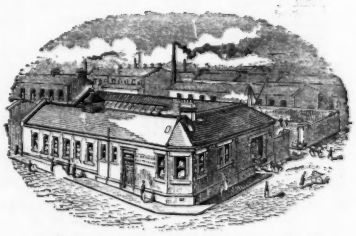
UNDERGROUND WET METERS FOR STREET-LAMPS OR OUTSIDE SERVICES.

(Dispensing with Footway Boxes or Special Lamp-Posts.)

WET PREPAYMENT METERS ARRANGED EITHER FOR PENNIES OR SHILLINGS.

WET STATION METERS IN SQUARE OR ROUND CASES.

WET EXPERIMENTAL AND TEST METERS.



Ventnor Street Works, Bradford.

Samples, Prices, and all Information on application.

NEW GRANGE WORKS,
EDINBURGH.
Telegraphic Address: "ALDER, EDINBURGH." Telephone No. 81 Western.

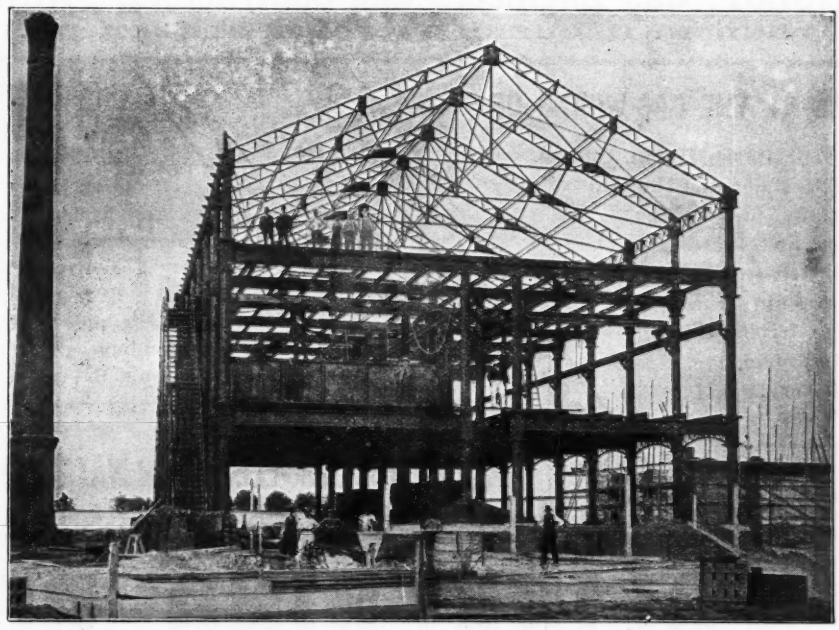
VENTNOR STREET WORKS,
BRADFORD.
Telegraphic Address: "ALDER, BRADFORD." Telephone No. 1222.

London Office: 13, VICTORIA STREET, WESTMINSTER, S.W.

THE WHESSOE FOUNDRY CO., LTD.

Works: DARLINGTON.

MAKERS OF EVERY DESCRIPTION OF GAS PLANT.



GASHOLDERS AND DRY-SEAL PURIFIERS A SPECIALITY.

PHOTO. OF STAGE-FLOOR PURIFIER-HOUSE TAKEN DURING ERECTION FOR THE UNION DES GAZ AT THEIR WORKS NANTERRE, PARIS.

London Office: 106, CANNON STREET, E.C.

THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE.

MAKERS OF

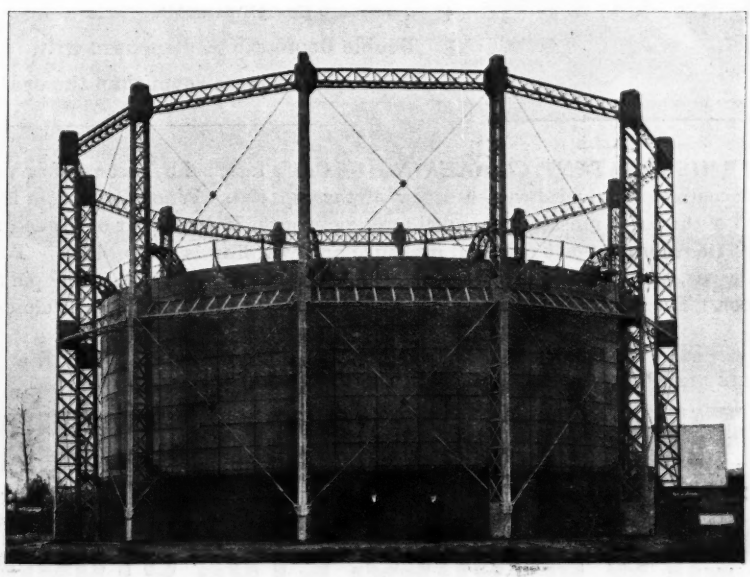
GASHOLDERS & GAS PLANT.

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES, PIPES, LAMP-PILLARS, RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF

STRUCTURAL IRON AND STEEL WORK

BRIDGES, ROOFS, PIERS, ETC.



WORKS & HEAD OFFICE:
TIPTON,
STAFFORDSHIRE.

LONDON OFFICE:
11, VICTORIA STREET,
WESTMINSTER.

TELEGRAPHIC ADDRESSES:
"HORSELEY, TIPTON."
"GALILEO, LONDON."

HISLOP'S PATENT RETORT SETTINGS.

The very best to adopt for Productive Capacity, Economy of Fuel, Durability, and Simplicity of Management.

R. & G. HISLOP, Gas Engineers and Contractors, PAISLEY, N.B.

LONDON: 11, QUEEN VICTORIA STREET, E.C.

INSTALLATIONS AT THE GAS-WORKS OF—

West Bromwich, Ilford, Tipton, Bilston, Cleethorpes, Rushden and Higham Ferrers, Barking, Ilfracombe, Cape Town, Erfurt, Pfortsheim, Iserlohn, Barmen-Rittershausen, Mülheim a.d. Ruhr, Nürnberg, Plauen, Rome, Lyons, Gijon, Brummen, Osterfeld, Warstein, Wiborg.

HIGHEST EFFICIENCY.
GREATEST ECONOMY.

THE DELLWIK-FLEISCHER WATER GAS PROCESS.
PATENTS IN ALL COUNTRIES.
BLUE WATER GAS, CARBURETTED WATER GAS.

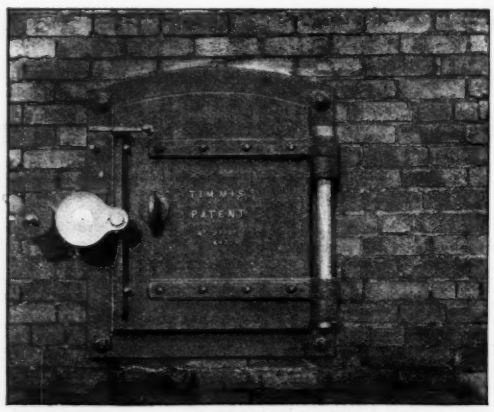
COMBINED WITH
SELF-CARBURETTING
AT

Imperial Continental Gas Association, Mariendorf-Berlin, Königsberg, Remscheid, Ludwigshafen, Güstrow, Salzwedel, Dortmund, Stuttgart, Hanau, Furth (Bavaria), Freiberg (Saxony), Osnabrück, Görlitz, Arnhem, Zutphen, Berne, St. Quentin, Barcelona, Beyrouth (Syria), Trieste.

THE
DELLWIK-FLEISCHER WATER GAS SYNDICATE
25, VICTORIA STREET, WESTMINSTER, LONDON, S.W.

TIMMIS'S PATENT CLINKERING DOOR.

It is a well-known fact that the ordinary Clinkering Door which is fastened only at the middle almost invariably warps with the heat, thereby **admitting primary air in unknown quantities and in the wrong place.** Where two fastenings are used to either single or double doors it is impossible to apply equal pressure with them, and as a rule only one of them is used, the results being worse than with the single fastening. With Timmis's Patent it is impossible to avoid putting equal pressure on both top and bottom and with the same ease as with the old single fastening.



Advantages.

1. It renders **warping impossible.**
2. **No primary air** can pass into the furnace **between the Door and the Frame.**
3. It is **the only Clinkering Door** that can be **sealed top and bottom by the operation of one fastener.**
4. There are **no complicated parts** to wear or get out of order.
5. **Double Doors** can be **dispensed with.**
6. It occupies **no more room than the ordinary door.**

DESCRIPTION OF DOOR.

TIMMIS'S PATENT CLINKERING DOOR is fastened by means of a vertical bar pivoted in the centre and provided with a screw at the top end. When the screw is tightened, the lower end of the bar is pressed with equal force against the lower corner of the door. **The two corners are therefore subject to equal pressure and warping is impossible.** To release the door the screw is loosened, and the bar, which is balanced by a counter-weight and rotates upon a strong pin attached to the frame, is moved clear of the door. The sketch above shows the position of the bar when the door is closed.

Further Particulars and Prices on Application to the Patentee:

GEO. H. TIMMIS, RIVER STOUR WORKS, STOURBRIDGE.

Telegrams: "TIMMIS, LYE." National Telephone: 13 LYE.

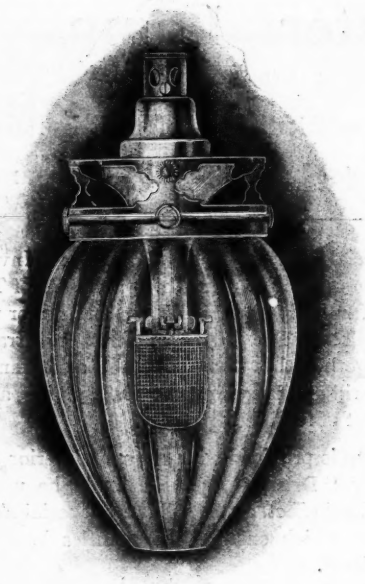
OR OF HARPER & MOORES, LTD., STOURBRIDGE.

THE ORIGINAL NEW INVERTED INCANDESCENT GAS-BURNERS

BRITISH MANUFACTURE.

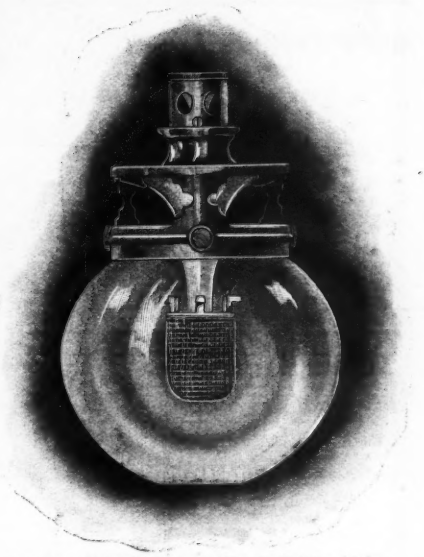
INCREASED DISCOUNTS TO THE TRADE.

New types of BURNERS at popular Prices.



MAXIMUM LIGHT WITH MINIMUM CONSUMPTION OF GAS.

The "Bijou" Burner in clusters for interior lighting has the decorative effect of Electric light at One-Eighth the cost.



No. 2 Burner only, in Polished Brass or Steel Bronze, **4s. 6d.** Globes from 6d. each. Mantles 7s. per dozen.

No. 3 Bijou" Burner only, in Polished Brass or Steel Bronze, **3s.** Globes from 4d. each. Mantles 6s. 6d. per dozen.

ONLY ADDRESS: **THE NEW INVERTED INCANDESCENT GAS LAMP CO., LD.,**

23, FARRINGDON AVENUE, E.C.

SAML. CUTLER & SONS,

MILLWALL, LONDON.

GASHOLDERS.

STEEL TANKS.

CONDENSERS.

ROOFS.

COLUMNLESS GASHOLDERS WITH CUTLER'S PATENT IMPROVED SPIRAL GUIDE ATTACHMENT.

JÄGER PATENT **PURIFIER GRIDS**

CAPACITY OF PURIFIERS DOUBLED.

PRESSURE CONSIDERABLY REDUCED.

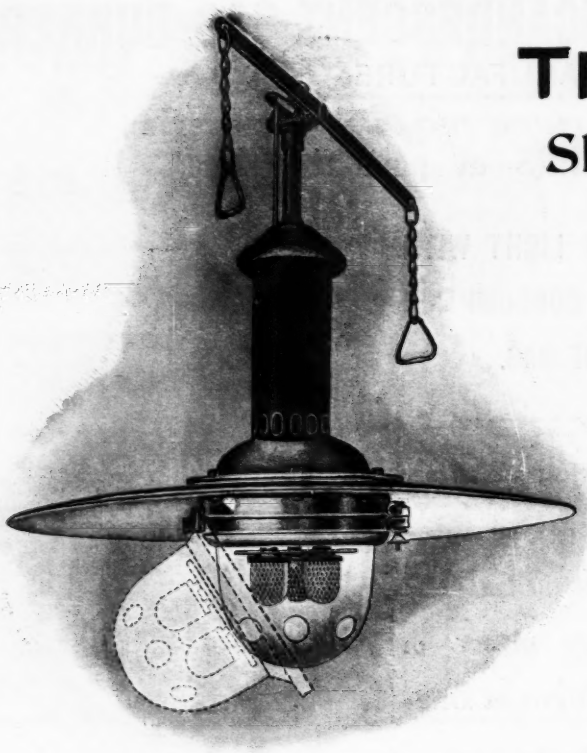
CARBURETTED WATER GAS

Maximum Efficiency Guaranteed.

A LARGE NUMBER OF PLANTS IN OPERATION.

Every Requirement for Gas-Works.

(188.)



The "DRURY"

Shadowless Inverted Cluster Lamp.

PATENTED AND REGISTERED.

A very efficient Lamp for all Buildings where a good downward light is wanted.

The special feature of the "**Drury**" Inverted Cluster Lamp is the way in which a cluster of Three Inverted Mantles is suspended from an interior white enamelled plate. The Three Mantles are arranged so close together that they have the appearance of one large brilliant Incandescent Ball, giving a surprising effect of its lighting power.

The Lamp is provided with a small interior Bye-Pass. Only "**Drury**" Mantles should be used to obtain the best effect, as they have a special Registered Holder which ensures the Mantles keeping a central position.

No. 2203. For Indoor use, 49s. 6d. Complete with Mantles, as shown. Extra Mantles, 7s. per dozen.

EVERED & CO., LIMITED,

27 to 35, Drury Lane, London, W.C., & 143, High Street, Shoreditch, E.

Works: SURREY WORKS, SMETHWICK, near BIRMINGHAM.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE, & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·20.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

D. HULETT & CO., LTD.

Show-rooms and Offices: 55 & 56, HIGH HOLBORN, LONDON.

Lamp & Meter Works: HARPUR MEWS, THEOBALD'S RD., LONDON.

MANUFACTURERS OF

OUTSIDE GAS-LAMPS

Suitable for Incandescent or Ordinary Burners.

DRY GAS-METERS, SERVICE-CLEANSERS, &c., &c

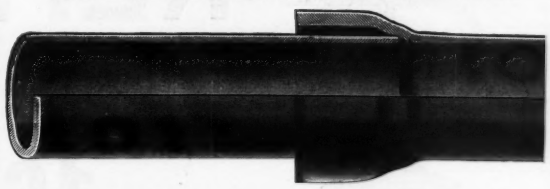
PRICE LISTS ON APPLICATION.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
ESTABLISHED 1860.

CLAYTON SON & Co Ltd
LEEDS
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD ALSO
THE ORIGINAL MAKERS OF
SPIRAL GUIDED GASHOLDERS
MAKERS OF ALL KINDS OF
STRUCTURAL IRON & STEEL WORK. STEEL FRAMED BUILDINGS
ROOFS RETORT FITTINGS
PURIFIERS RETORT LIDS
ANTIFREEZERS for Gasholders
STEEL TANKS
OF ALL SIZES
MAKERS OF THE LARGEST IN THE WORLD.
GASHOLDERS
OF EVERY DESCRIPTION & SIZE
HIGH CLASS BOILERS FITTED WITH CORRUGATED FLUES.
DEIGHTONS
Telegrams "GAS LEEDS." London Office 60 Queen Victoria St E.C.

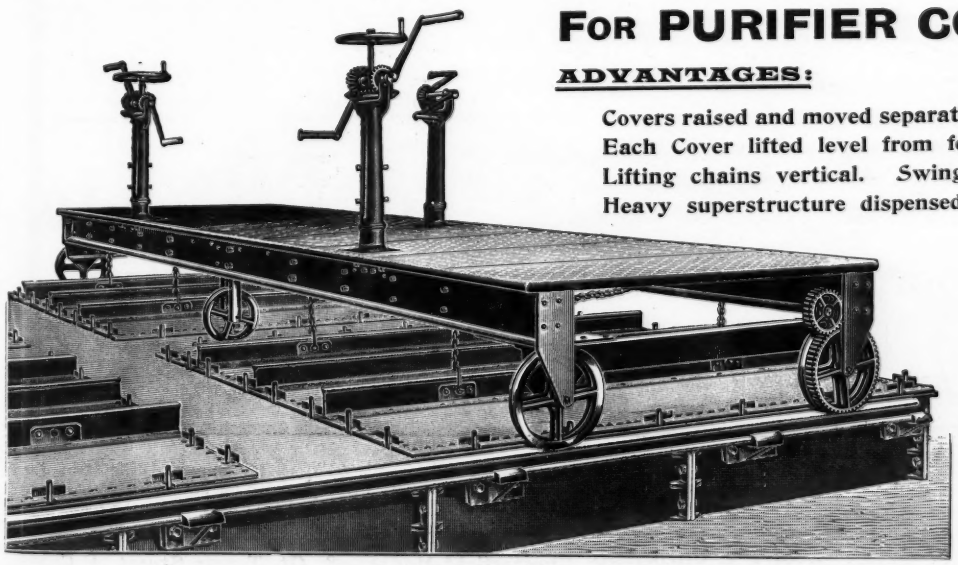
MANNESMANN



WELDLESS STEEL SPIGOT AND FAUCET PIPES
In any Length up to 40 feet for
GAS & WATER MAINS.
A PERFECT SUBSTITUTE FOR CAST-IRON MAINS.
— THE —
BRITISH MANNESMANN TUBE Co.,
LIMITED,
110, CANNON STREET, LONDON, E.C.

R. & J. DEMPSTER, Ltd.,
Telegraphic Address:
"SCRUBBER MANCHESTER."
MANCHESTER.

HOVEY'S PATENT LIFTING CRANE
FOR PURIFIER COVERS.



ADVANTAGES:
Covers raised and moved separately or Two together.
Each Cover lifted level from four points.
Lifting chains vertical. Swinging avoided.
Heavy superstructure dispensed with.

Prices and Particulars on Application.

London Office: 165, GRESHAM HOUSE, OLD BROAD STREET, E.C.

THE KEITH LIGHT.

INTENSIFIED INCANDESCENT GAS.

1600 INSTALLATIONS
now in use.

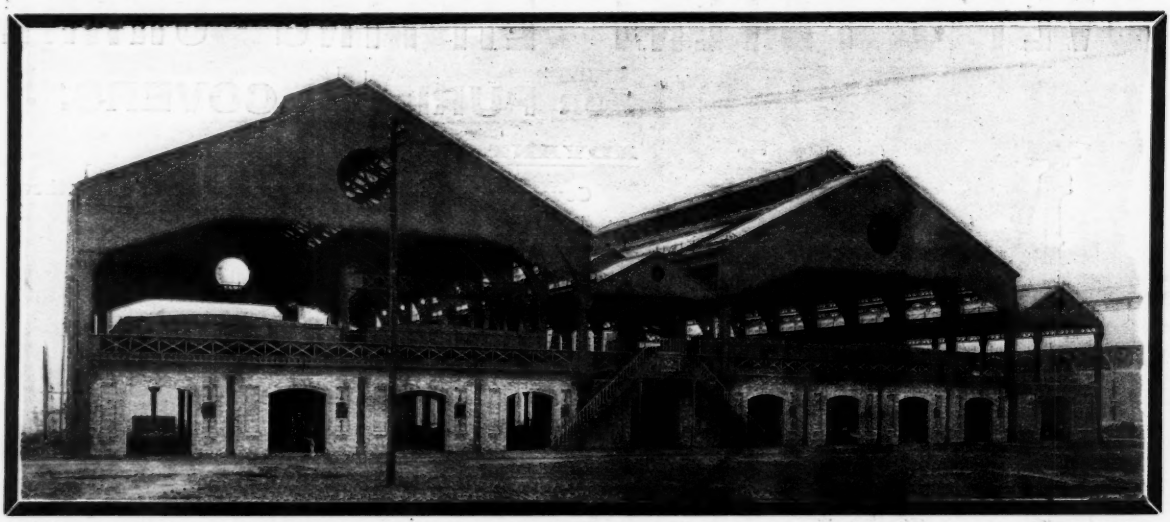
KEITH'S PATENT GLOBE REFLECTOR.

An ideal fitting for Workshop Lighting. It is perfectly anti-vibrated, and can be fitted either with ordinary Pilot Light, Electric Lighter, or Automatic Bye-Pass. See 1904 Catalogue for further particulars.

Patentees and Manufacturers;

JAMES KEITH AND BLACKMAN CO., LTD.,
27, FARRINGDON AVENUE, LONDON, E.C.

CLAPHAM BROS., LTD., KEIGHLEY,
SOLE MAKERS OF
THE "ECLIPSE" SPECIALTIES
IN WASHER-SCRUBBER, WATER-TUBE CONDENSERS DRY LUTE PURIFIERS, AND TAR EXTRACTORS.



The above is a view of a Purifying Plant entirely undertaken by us, and erected for the Manchester Corporation to the designs of the Engineer, J. G. Newbigging, Esq. It covers 4444 square yards and contains Twelve Purifiers with space for an additional Four, each 35 feet square, with a total area of 14,700 square feet. Upwards of 2490 Tons of Steel and Iron were used.

London Representatives: **Messrs. JONES & YOUNGER, Chesterfield House, 98, Gt. Tower Street, E.C.**
Scotch Representative: **JOHN D. GIBSON, 74, York Street, Glasgow.**

Printed for WALTER KING by King, Sell, & Olding, Ltd.; and published by him at 11, BOLT COURT, FLEET STREET, in the CITY OF LONDON.—Tuesday, Feb. 7, 1905.